

# *Library Trends*

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*Scientific Management  
in Libraries*

RALPH R. SHAW, *Issue Editor*

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January, 1954

# *Library Trends*

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RALPH R. SHAW, *Issue Editor*

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## *Introduction*

RALPH R. SHAW

THE PAPERS IN THIS issue show that there is a trend toward the application of scientific management to libraries—and indeed a rapid one. Such an issue would have been quite impossible twenty years ago, and even now some of the articles record directions of growth rather than achievements. It would be interesting to compare it with a similar one to be produced some ten years hence.

As construed in this number scientific management is something quite different from the common pictograms of "time and motion studies," or "speedups," which the term often conjures in the mind of the man who hears it. Going back to the originator of scientific management, it is obvious that the phrase was meant to include all of the concepts covered in the definition by Braum, Person, and Cooke, which read, "Scientific management exists primarily as a concept and a mental attitude toward achievement. It exercises a basic systematic technique for discovering and establishing objectives, plans, standards, methods, schedules, and controls of an enterprise, all within the laws of each situation and in an environment of high morale. It thereby exemplifies the best use of human and material energy."<sup>1, 2</sup>

In this sense, scientific management includes not only the arts of making two typewriter strokes grow where one grew before. It emphasizes Frederick Winslow Taylor's application of the scientific method to the problems of policy and programs as well as to those of broad or narrow operations, an area which has recently been rediscovered as "operational research."

It seems fitting, therefore, to start with Errett W. McDiarmid's paper on the place of the scientific method in the formulation of policies and programs. The number then proceeds to broad surveys of the application of scientific management to public and research libraries; then on to the methods used, including time and motion studies, flow

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charts, standardization, workload analysis in libraries of various types and in special types of library work, standards of performance, and controls; and finally to examples of the application of the philosophy and methods in mechanical aspects as well as in programs.

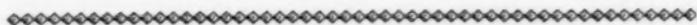
Stated in its most fundamental terms, scientific management is really little more than organized common sense. As is true of the scientific method itself, it follows the dictum that man's judgment cannot be better than the information upon which that judgment is based. It seeks, therefore, to establish the facts of any given situation, taking into consideration all of the factors which must or should influence opinion. It uses careful methodology to make certain that the facts are a reliable sample of the pertinent data, and then, wherever feasible, wherever the facts deduced are conclusive, it follows them to their logical conclusions.

While scientific management uses mechanical and statistical methods and measures in planning, it is not a mechanical process. Rarely—except where procedures and systems are paced by machines, which is almost never the case in libraries or offices—can the judgment resulting from the fact-finding be completely objective. So, at best, the method provides a firmer base for conclusions, and a basis for determining, both in advance and after an alteration has been made, whether or not a change is an improvement.

These characteristics of scientific management are amply attested in the papers in the present issue. In some they show conclusively that the "priceless ingredient" in scientific management is man.

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## Scientific Method and Library Administration

ERRETT W. McDIARMID

SOME PEOPLE VIEW the terms scientific method and library administration as incompatible. According to their view scientific method is something that may be used in a vague area of business or manufacturing or industry, but has no place where humans are concerned or where values are important and results are gauged in terms of the conveyance of ideas rather than of items. The assembly line can be studied scientifically and its cost accurately appraised, but one must not use measuring devices on things as intangible as information received or understanding gained. There are those who do not agree, and as with many differences of opinion, both sides of this argument have points in their favor. Only after one defines his terms and clarifies the issues involved is it possible to look objectively at the questions—does scientific method have any place in library administration, and if so, what place?

Library administration, broadly defined, includes all the things that go on from the time a group of citizens establishes a library to serve its needs, to the moment that library does something which helps a citizen. The objectives of the institution, and its methods, its facilities, and its personnel—all are involved. To paraphrase a well-known definition, library administration is as much concerned with men and materials as it is with their use in fulfilling accepted purposes.

Implicit is another point not always recognized. Library administration is charged with accomplishing a job, but more than this it is expected to perform its task as well and at as low cost as it can. Nor are these aims antithetical; for a good job can be done economically, even if in ways that differ in terms of expense. Obviously good ad-

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ministration chooses the cheaper manner, or, if it selects a more costly way, satisfies itself that the latter actually is better.

This, in effect, poses library administration's major problem: given certain things to be done, what are the ways in which they can be done best, and what will be the cost of each? And rarely is the answer crystal clear. Even for a very simple or limited function, there are diverse degrees of excellence to be achieved and numerous variations in expense. One does not find that the most excellent way always is the cheapest, nor that the cheapest is always the poorest. One way gives certain advantages and involves certain outlays, while another entails other merits and costs. How balance these facts, and how decide what is best?

There is a considerable body of folklore regarding administrative "hunches." Prominent in this is the belief that a chief's feelings generally determine his conclusions. With it goes the picture of the busy administrator who listens to a staff member, then stares out the window for a moment and barks out a decision. The philosophy seems to be: "One has to have a feeling for this sort of thing, a hunch, and once the hunch comes settle the matter and go on to the next." Naturally, many questions come along in a busy administrator's day that have to be decided quickly—where someone has to weigh alternatives and reach a judgment. But administration by hunch soon becomes administration by guess, and society has yet to discover many people who can guess correctly even a fair proportion of the time.

Actually, of course, the popular stereotype has more to it than appears above. For even the administrator who claims he is acting on his hunches is doing much more than that—he is using, perhaps without being aware of it, a body of experience, facts, and information built up over years. He may not consciously isolate, tabulate, and total up all that he brings to bear on a given problem, but his decision is inevitably influenced by it. In one degree or another he is applying scientific method to administration. That method is nothing more or less than the collecting, evaluating, and applying of facts. That it is done in the cerebrum rather than on a Friden makes no difference.

But this too is an oversimplification. Though scientific method does involve the assembling and evaluating of data, it implies much more than recalling those facts that happen to come to mind when a certain problem is under discussion. Such a procedure would be fragmentary, and subject to the chance of memory or influenced by the recency with which something had been reported or discussed. One could

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never be sure that all the pertinent evidence had come to light, or was used in reaching a decision.

The real purpose of scientific method, thus, is to see that the best and most complete factual information is discovered, made available, and brought to bear upon a given problem. To whatever extent this process is complete and objective, scientific method is being employed in library administration. Accordingly we now can answer the first question posed above—does scientific method have any place in library administration?—with an unqualified yes.

The next question then is, what place can scientific method occupy in library administration? Where can it be used, and what will it achieve? Though as implied above scientific method should not be thought of as one thing in one area and another elsewhere, for purposes of clarity it may be desirable to separate two of its aspects: (1) scientific method as employed in appraising objectives and programs; and (2) scientific method as a tool for superior administration. Later papers in this issue will develop the latter theme extensively; the first is taken up in the following paragraphs.

How can the scientific method help the administrator decide matters of broad policy, of program, or even of objectives? First, the scientific method as a way of studying problems helps the administrator appraise even qualitative and subjective questions more carefully and accurately than otherwise would be possible. For instance, the question arises whether a library should undertake a new line of activity. How can the scientific method help in such a situation? It can aid at least by outlining clearly and carefully the steps to be taken in arriving at a decision.

These are:

1. Defining the problem.
2. Identifying and stating the assumptions.
3. Breaking the problem down into its component facets.
4. Assembling all the pertinent facts available.
5. Collecting and analyzing facts not already in hand, but needed.
6. Evaluating and appraising the facts and their relation to the problem.
7. Constructing a hypothesis regarding the best solution.
8. Testing the hypothesis in the light of various aspects of the problem and the pertinent facts.
9. Final analyzing, and the reaching of a conclusion.

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Perhaps a simpler way of discussing this subject would be to say that the scientific method means the application of logical reasoning to a problem. But unless one remembers clearly what goes into the process and takes great care to see that no step is omitted, he is likely to fall back closer to administration by hunch.

It should be clear that at every step in the above process, judgment and intelligence are required. The scientific method is not like a chain reaction, where one step leads automatically to the next until an end result is achieved. The person employing it must decide how to define his problem clearly and completely, and a considerable leeway of judgment is possible. This judgment, however, is much more likely to be sound and correct if one consciously sets out to approach the problem systematically. Thus even where there is a necessary dearth of factual information and of quantitative data, the method helps.

Second, as implied above, the scientific method aids the administrator by refining and clarifying the problem. Very few questions exist upon which no factual information is available or could not easily be obtained. Even in the most theoretical problem, where broad objectives and purposes are the major consideration, there are likely to be some data that would illumine some aspect of it, however minute. If this can be done within the limits of time and money available, and the facts necessary can be collected, obviously the decision is simplified just that much. To cite one specific example, if we know how much it costs to circulate phonograph records, or how many people have phonographs on which to play them, we have advanced one step toward learning whether or not to inaugurate a program involving such records. This does not mean that collection of a few facts will decide an issue, but it does mean that they can help to make a decision more sound.

Third, scientific method will contribute to rendering a decision more widely accepted, or, if it is to be made by someone other than the person charged with studying the problem, will greatly increase the likelihood of the right decision being reached. Using the example cited above, suppose the librarian decides that it would be desirable to circulate phonograph records, but he must have endorsement by the library board. Of course the board will weigh carefully the librarian's statement of purposes and objectives and his appraisal of the good to be accomplished, but it will enter into a decision with more wisdom and certainly with more enthusiasm if it has even a few facts to guide it. For instance, if there can be a demonstration that

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the cost will be so much, and that this is well within the library's resources, the chances will be increased that the board will approve.

Finally, the use of the scientific method can assist the administrator in strengthening morale. If it is known that a given matter has been studied objectively, and that pertinent facts have been collected and analyzed, a decision is apt to be regarded as sounder than otherwise would be the case. Reaching a conclusion by the scientific method may not be necessary to satisfy those who agree with it, nor will such procedure always convince those opposed to the decision, human nature being what it is. But it may elicit and justify recognition and acceptance. One can accept a judgment even contrary to one's interest if a modicum of facts points in that direction.

How can the scientific method serve as a tool for better administration? As suggested above, this subject is developed in other papers in the present issue and need not be dealt with extensively here. Workload analysis, standardization, time and motion studies, all of which are treated in other papers, illustrate the application of scientific method to administrative problems. The point to be made is that in any aspect of administration there are facts to be obtained, analyzed, and evaluated, and that when they are utilized, better decisions can be reached than could be anticipated otherwise. However, lest the foregoing imply that application of the scientific method, or the use of scientific management, offers an easy solution to all problems in libraries, several cautions may well be noted.

First, it cannot be overemphasized that scientific method is an aid to administration and not a substitute for it. No matter how detailed the facts, or how complete the analysis of a given matter, someone has to take the final action regarding it. Indeed, unless there is some happy utopia where all data are easily available, someone has to make a decision as to which facts to collect. For rarely is there lack of question as to the relative importance of the materials needed. Often one has to admit that, although it would be nice to have certain information, to obtain it would be unduly difficult and expensive. Use of the scientific method should help an administrator to reach a wise decision, but it will not relieve him of the necessity of making a decision.

Second, use of the scientific method can be overdone, or, perhaps more accurately, improper use of the scientific method may handicap an administrator. What is referred to here primarily is the tendency to seek facts for the sake of collecting facts, rather than for their relevance to a given problem. It is very easy, particularly when one does

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not have to do the job oneself, to assemble data indiscriminately. This is not wise, however, unless careful judgment enters into the decision regarding the relevance of the data before they are assembled. Perhaps the most common criticism of the questionnaires developed by graduate students for their thesis problems, or indeed by administrators when they wish to find out how others are doing things, is that the pertinence of the information requested has not been seriously considered. Why collect it? What will one have if it is obtained? Of what use will the facts be in solution of a problem?

It should be clear that caution in deciding what facts to collect does not imply that one must know in advance what they will reveal. It means simply that one must be sure that they will be relevant, and will aid in resolving a problem.

In the judgment of some, librarians have erred on the side of neglecting factual information. Admitting that librarianship is a profession where there are many intangibles, and for which objective data are not always easily available, one still can argue that this does not condone neglect of facts. Even if information is hard to obtain, it still should be sought where it can be secured and where it will be relevant.

A library's policies and programs are close to its *raison d'être*. Routines, methods, devices, equipment—these are used to enable it to do something. They are fundamental to the work undertaken, and the better they are the better the results. Furthermore, because they are tangible, they seem to be best subject to application of the scientific method, or of the principles of scientific management. In a sense this is so, since we can measure more adequately the cost of cataloging, or the expense of photocopying as compared with other reproductive procedures, than we can measure the aesthetic satisfaction derived from reading a poem. But administration entails more than deciding the most economical way of carrying out a given operation well. It must regularly weigh the values derived from reading a poem, against the values derived from reading a novel, or a biography, or a magazine of current history.

Scientific method or scientific management will not give one the answers. Even if one had endless arrays of facts regarding the relative cost of circulating poetry and novels, regarding changes of attitude before and after reading, regarding the interests of readers, and regarding community needs, someone still would have to weigh and appraise the data. But if relevant facts can be obtained on even a part

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of a given question, if the problem can be analyzed carefully and critically, and if logical reasoning can be substituted for emotional impulse, scientific method can become a valuable aid to administration.

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## Scientific Management in Public Libraries

HERBERT GOLDHOR

THIS PAPER considers the general implications of scientific management for public libraries. It begins with a definition of the relevant terms and concepts, then reviews briefly the main possible methods and techniques, and finally suggests some future possibilities. Subsequent articles in this issue deal in detail with various aspects of the subject.

*Definition of Terms*

Needless to say, "scientific management" cannot be usefully defined in a short sentence. This is partly because it embraces many different potential areas of emphasis, and partly because it represents a type of thinking which, although well known for over half a century, is still developing, and partly because it has varying implications and applications for different kinds of work. The present consideration of scientific management stresses those features which are most appropriate to public libraries, and which are general in nature. If scientific management means anything more than common sense, its significance lies in what science has to contribute to common-sense findings.<sup>1</sup> We are all familiar with and recognize as desirable certain hallmarks of science, e.g., a detachment and objectivity which overrides passion or prejudice, a penchant for quantitative measures which allow for precision, and care in defining terms and in using such terms only as defined. There are, however, three qualities of science which are not always either recognized or accepted, and which are of particular importance in the application of scientific management in public libraries.

The first is that the method of science calls for an awareness and a painful sensitivity to the assumptions underlying the reasoning on which an investigation or study rests. An assumption is a proposition as to the relationship between two or more factors which is not known

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to be either true or false but which is stated as though it were true. In a world which is for practical purposes infinite in its range of undiscovered truths, the finite nature of man's knowledge makes it necessary for him always to act on the basis of assumptions or else not to act at all. The use of assumptions is neither good nor bad, if they are recognized for what they are. The danger is that a proposition originally introduced as an assumption may come in time to be treated as proven fact, when perhaps its truth has never even been tested, let alone established. Langer shows very nicely how our very language, in the questions we put, sets limits to our answers by the assumptions on which it rests.<sup>2</sup>

One of the early signs of progress in a scientific investigation appears when one can begin to formulate the "right" questions to ask. In large part this turns on a critical awareness of the crucial assumptions, and it is often fruitful to consider alternate or opposite assumptions and then see what logically follows. Thus, for example, is it actually true that patrons of public libraries need, want, or tend to seek author, title, and subject entries in a card catalog? Do fines for overdue books actually serve to bring books back faster, or even as fast, as other possible devices or none at all? Do library employees more often take jobs elsewhere because of higher pay than because of other, and correctible, working conditions?

The great virtue of being conscious of one's assumptions, of examining them carefully, of considering alternates, and of testing the most crucial propositions, instead of "assuming" what the truth is—the great virtue of these acts is that they enlarge one's mental horizon considerably and open up problems to many more approaches than are otherwise available. At one time, for instance, it was generally thought necessary that in public libraries all books be kept on closed shelves. The theory on which that belief rested (e.g., that people would steal the books, or at least seriously disarrange them) was challenged by some librarians who had no direct proof of the falsity of the assumptions but who were willing to take the risks involved in abandoning them. It should be recognized that following out contrary suppositions does not guarantee success, but merely increases the number of possible lines of action, some of which are likely to be ineffective. But anyone who does not count on having some failures in the use of the scientific method, for a diversity of reasons, is likely to be disillusioned earlier rather than later. The successful application of scientific management depends, more than on any other single factor, on the ability

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of the investigator to pursue his study in the light of the widest possible number of alternatives. And this is all the more important in librarianship because many of the assumptions on which library practice rests deal with factors which are variables and not constants; thus an assumption may be true at one time in history and not necessarily at another.

A second major quality of science which is important in this context is its dependence on theory. All science embraces accurate observation, but not all accurate observation is synonymous with science. The differentiating characteristic is the presence or absence of a theoretical approach which serves to give direction to the work of observation and to allow for its analysis and interpretation. If observation without theory is sterile, theory without observation is useless for operational purposes. The net result of observation should be the revision of the theory which initiated the observation. Thus it is that the cycle of theory, observation, and reformulation of theory makes science ever dynamic and ever subject to self-improvement.

It probably is easy to see how the cycle works and works beneficially; the difficulty is in generating the initial theory, which is as true in other fields as in librarianship. The need to fill the gap is one of the reasons we keep coming back to attempts at a philosophy of librarianship. Actually, however, for practical purposes and for use in scientific management, it is probably enough to deal in terms of hypotheses rather than of theory. The difference between a hypothesis and a theory is basically the difference between the specific and the general. A theory is an attempt to explain in as general terms as feasible the nature of as large a group of phenomena as possible. Any one theory may give rise to a potentially infinite number of hypotheses, each of which is an attempt to restate a part of the theory in more specific terms and with reference to a smaller group of instances. By definition, a good hypothesis is one which is so stated as to point to the data which need to be gathered by observation, in order to test the truth or falsity of the hypothesis and in turn increase or diminish faith in the general theory.

The habit of thinking in terms of hypotheses is likely to be of considerable value to librarians, especially in attempting to apply scientific management.<sup>3-5</sup> To ask such a question as "How can I develop a circulation system better than the one I have now?" is not very useful. To rephrase the question as a hypothesis—using such stilted language as one quickly abandons after developing a few hypotheses

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—one might reasonably embark on a study to ascertain whether photographic charging is faster in recording the withdrawal of books than is any other known scheme. Now notice that this hypothesis clearly involves a supposition that speed in charging books is an important, if not the most important, element in a superior charging system. It also seems to reflect a general theory as to the nature of the operation of public libraries, else why pursue this line of approach? Third, it narrows the subject down to a small but manageable scope. And finally, it points clearly to the body of data which must be ascertained in order to restate the hypothesis as a proposition of tested truth, to revise it, or to discard it as untrue.

All applications of scientific management of any consequence can be rephrased in such terms, and they will be more successful if initially they are so conceived and executed. Just as consideration of alternative assumptions is no guarantee of fruitful results, so use of a hypothesis may produce negative effects. To use a hypothesis means by definition that one is committed to test its truth or falsity. He does not set out to make a case for it, which would be to operate on the basis of a prejudice. The value of a hypothesis lies not in its being used to screen out data unfavorable to it, but in its help to the investigator in deciding which facts are relevant and how to interpret them after they are collected. In large part the hypothesis performs its function by forcing the investigator to think carefully about a problem before beginning to collect data.

The third aspect of science which is highly relevant to its use in scientific management is implicit in the goal which science strives to attain. Science starts with attempting to comprehend a phenomenon and then proceeds inexorably to achieve control over what it is examining. It cannot begin without clear, complete, and precise descriptions; it cannot advance without understanding the "how." But so far science is passive. It comes into its own when it can make correct predictions as to what will happen when specific factors are brought together in certain ways and under given conditions. It has nothing left to achieve when it can make correct predictions in quantitative terms as to the results of minute variations in any factor or any environmental conditions; and that is what is meant by control. Similarly scientific management is concerned not alone with getting results; after all, as good or better results have been and can be secured by trial and error, by insight, or even by guess or luck. But what nothing else has ever been able to do as well, and as consistently, and

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over as broad a range of problems, is to predict the future, and especially to do so in measurable terms based on known initial variations.

Another way of saying all this is that a prime function of science is to distinguish between correlation and causation. Now it is true that if X causes Y, then X will be correlated with Y; but it is also true that when X and Y happen to be correlated it may be not at all clear whether X causes Y, Y causes X, both are caused by Z, or the correlation is the result of chance alone. Probably the single greatest difficulty in science is to ascertain causation between two factors. Suffice it to say that one test, and the most conclusive one, of our knowledge of causation is the ability to predict correctly the response elicited by a given stimulus. The development of science in this respect—from a concern with description to a mastery of control—is clearly evidenced in the history of scientific management; and future developments in scientific management are sure to emphasize ascertaining the causal relationship in any given problem. It is useful in this connection always to state a hypothesis with a causal element in it, to explain why the relationship expressed is deemed to hold true.

So far we have considered only the "scientific" part of scientific management, and indeed the historical role of the second half of the term has simply been to limit the field of application of the scientific method. Scientific management, as a body of principles and techniques, constitutes a sort of applied science which already is spilling over in its applications to other areas than those of management (in the sense of administration) and of production, and this is a trend which probably will continue and grow. However, consideration of scientific management is focused here and now primarily on those applications in libraries which pertain to activities other than public service.

Such a distinction is one of convenience, however, rather than integral or necessary, and reflects the usual line of historical development. By scientific management is meant here the study of work operations, both those common in other institutions generally and those peculiar to libraries, in order to control them. This definition approximates the usual understanding of the term and identifies the area in which most activity is currently proceeding in public libraries. For practical purposes it excludes certain subjects which are potentially subject to such study, such as the service functions of public libraries, experimentation in public library activities, democratic administration, and community analysis. Just as scientific management

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surely will extend its application to these other fields in time, so too wherever it is used it tends to move from naive considerations of economy, to those of efficiency, to those of control on behalf of any given quality or combination of qualities.

#### *The Main Possible Methods and Techniques*

The possible procedures in scientific management are numerous. New techniques are constantly being devised, and all techniques need constantly to be scrutinized for their relevance to the problem at hand. The classical type of study is that of time and motion, utilizing the stop watch and motion picture, but this has very limited application in public libraries. In general, the main techniques of scientific management useful in public libraries can be conveniently grouped under two headings. There are those which deal with what might loosely be called policies, and may never be represented by anything more than a statement on paper, and others which have to do with changes in physical layout and in actual work operations.

*Studies on paper.* All techniques of scientific management are likely to have their results expressed at one point or another in written documents, and in many instances they can find expression in no other way. It is this latter group which, in relation to libraries, now is to be considered. It is a large and heterogeneous collection, all the more so because library procedures involve a large component of paper work and because traditionally paper work has received less attention than machine production of goods, for example. The techniques to be discussed here are only a sample of those available; not all of them are recommended, and certainly new and better ones are sorely needed.

One of the more general techniques which finds expression primarily only in written reports, and which is used or useful in public libraries, is the survey.<sup>6</sup> Library surveys range from long, expensive, and discerning studies<sup>7</sup> to short, inexpensive, and superficial reviews. They vary in scope from the most comprehensive<sup>7</sup> to the most specialized.<sup>8</sup> They may be based on extensive, factual examination,<sup>7</sup> or on little more than subjective impressions. They often are occasioned by motives irrelevant to scientific management,<sup>9</sup> and in any event they incorporate no methods or techniques peculiar to themselves.<sup>10</sup> Hence a library survey as such is valuable for scientific management only if the person in charge has a better mind than the chief of the library surveyed, or if he utilizes other more specific techniques which are equally available to all to use.<sup>11</sup> Both these conditions are found in

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some instances, but the survey technique in general is probably not a particularly useful tool in scientific management.

On a lower level of generality, there has been all too little study and development of techniques with a view to formulation and application of specific institutional objectives. The basic consideration is simply that a library which doesn't know where it is going and where it wants to go is likely to supply ineffective answers to the problems of its age.<sup>12</sup> Goals, clearly stated in operational terms, may specify the areas and the direction in which improvement by means of scientific management is needed. How to evaluate and state library objectives is not easy to describe,<sup>13-16</sup> but their basic necessity for purposes of improvement in work is becoming ever clearer and more fully recognized.<sup>16</sup> All too many specific activities in public libraries would be greatly changed, or eliminated, if a set of precise aims were available by which to check their validity. Then too a library's goals, if properly stated, can serve to indicate the type of control which one would seek to achieve through scientific management, e.g., whether to put first speed in charging books, or immediate knowledge of the whereabouts of every book.

The usefulness of library goals lies not in their statement but in their use. They supposedly determine policies, and policies find expression in work procedures. Measurement of the results of work activities then may be used to review and revise procedures and policies in the light of the aims. The review of the objectives themselves is usually called evaluation, and is another story. A library's goals normally will be used initially in planning, both short range and long range; and planning potentially affects all other operations, for to plan is "to 'walk out to meet the future' and mold it to the pattern of our dreams."<sup>17</sup> The techniques of planning are many and useful, but are derived mainly from experience with programs for buildings,<sup>18</sup> with budgets, and with the control and coordination of materials as on an assembly line. The techniques for planning the development of an adult education program, for example, are less well understood. We are badly in need of case studies, of the "capture-and-record" type, of planning for libraries.

The administrative organization of an institution is the most general subject in connection with which techniques of scientific management for public libraries are well known. By administrative organization is meant the grouping of responsibilities and functions into formally designated units in order to carry out the purposes and goals of an

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institution. Logically the organization of a public library should mirror its aims;<sup>19</sup> actually most public libraries have an organization which has developed in the course of time on a haphazard basis, by the simple accretion of new organizational units to handle new functions. Thus it is that library surveys tend to consider the organization of the institution, since there is usually so much room for improvement. Some of the common principles of administrative organization, which are often violated in public libraries, are: (1) The span of control should be kept short. (2) Responsibility for any one function or service should be clearly allocated and not diffused. (3) Homogeneous functions or services should be unified, and an organizational unit should be assigned one or related functions and not unrelated ones. (4) Adequate provision should be made for staff and auxiliary as well as for line or operating functions. (5) Administrative organizations should be reviewed periodically.<sup>20, 21</sup>

There are various techniques for the analysis and improvement of administrative organization, such as preparation and publication of an organizational chart, authorization of lines of technical advice as well as channels of command, creation of devices to secure and improve coordination (as exemplified for libraries in the role of the co-ordinators in the Enoch Pratt Free Library),<sup>22</sup> use of specialists in place of generalists in the administrative hierarchy, and the development of more levels in the organization as the institution grows in size (as instanced in the regional branch libraries in Chicago).<sup>23</sup> All this points to unsolved problems and unanswered questions in the field of public library administration. For example, is it necessarily true, as military authorities say, that a staff officer cannot also perform line functions? Do the usual principles of administrative organization, tested and proven in large organizations, apply equally to small libraries?

Personnel administration is another large and important area in which public libraries are beginning to use devices of scientific management and are sure to profit by it. Probably the single most important technique here is that of the position-classification plan.<sup>24, 25</sup> The essential principles for the correct use of this involve a job analysis, provision for continual review, emphasis on the duties assigned and not on the qualifications of any particular or present employee, and recognition of the relationship with a salary schedule and of the other potential measures utilizing a position-classification plan. Like most techniques of scientific management, the position-classification

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plan can be devised by an outside group or by a library administration and staff; given a minimum level of competence, which can be developed, the latter method is likely to be more successful in winning acceptance for the scheme and in securing continuing attention to the results of its operation.

Other techniques of scientific management in this area deal with such matters as salary standardization, improvement of working conditions (in regard to light, noise, fatigue), systematic in-service training, and employee turnover. In connection with personnel administration, it is clear that scientific management needs to be designed for ends other than simple and immediate economy. Thus, elimination of employee turnover probably is not a desirable objective at which to aim. Not to be excluded from this field, but still awaiting development for the most part, is the whole vast field of democratic administration.

Financial administration also presents much fertile ground for the application of techniques of scientific management. Though the financial records of public libraries are relatively simple, they typically are handled with less efficiency and less regard for their net contribution than is even now possible. The single most important technique relevant here is the performance budget,<sup>26</sup> which not by chance or coincidence demands a statement of the institution's functions and goals. The Hoover Commission on Organization of the Executive Branch of the Government recommended this type of budget,<sup>27</sup> and it is being used now by the federal and other governments, including some libraries. The approach of the performance budget as a plan for the year ahead involves numerous special techniques of scientific management, from work measurement (to justify estimates of expenditures) to an adequate financial reporting and funds allocation system (to prevent deficits). Nor do these techniques necessarily require additional records, especially where public libraries can eliminate financial accounts they do not really need.<sup>28</sup> Because such institutions have so little money to spend, they tend to overaccount for every dollar. The legal records of a public library's finances may have to be kept to the penny, but not those for administrative purposes. Some business firms now keep their financial accounts in whole dollars only; the cost of recording the pennies is more than the amount of money so involved.

Closely related to the budget on the one hand and to the improvement of specific work methods on the other hand is the broad tech-

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nique of cost accounting. We have learned a few things to do in cost accounting studies in public libraries, e.g., to make clear definitions of work units, to keep simple records, to accumulate relatively short runs of data but to secure them at least more than once, and not to concern ourselves over indirect costs which are relatively small and difficult to allocate. Even within these limits, cost data are useful and important for public libraries. Thus the only compilation of bookmobile operating costs known to this writer is far from ideal,<sup>29</sup> but it at least provides some basis for a decision as to when the use of a bookmobile is financially justified. Similarly the knowledge of the cost of a procedure or work operation will often determine its continuance or modification. For example, it may well be that the cost to a public library of checking all new book orders against the file of outstanding orders and the shelf list may be more than the cost of the books which are so found and which would be unconsciously duplicated if that check were not made.

Not so incidentally, the principle of gathering such cost data for only a sample period of time is equally relevant to the application of most other techniques of scientific management, especially those discussed below. The indefinite collection of such figures is not only discouraging to the staff members, who usually must add that job to their regular duties, but it is unnecessary, particularly if additional samples of comparable facts are gathered later to check the stability of the data secured and to measure the results of changes introduced. In a crude way this is the basis of sequential sampling, which uses mathematical formula to determine when further data are unnecessary.

*Studies of work methods.* We come now to the second main division of the methods and techniques of scientific management, namely, those which result in physical or at least discernible changes and are therefore usually concerned with the actual methods used in operations. This is the field of activity which has been most highly developed both in industry and in libraries, but it would be a mistake to assume that the studies on paper, discussed above, are potentially less important. Studies of work methods are generally of the same basic pattern, including some form of recording of the present method and logical analysis of the record so produced, followed by installation of some change to secure a desired objective or degree of control over the operation in question.

Recording the present method of work may be done in a number of different ways. Industry uses the stop watch and camera to record

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arm movements of machine operators; the film is then studied intensively to detect those movements which are unnecessary or which can be replaced, as by a gravity feed, or which are fatiguing; the new work method is then devised and installed, utilizing retraining of the employee, new machines or equipment, and improved layout of the processes. In government generally and public libraries particularly this method is usually inappropriate.<sup>30</sup> The general approach developed for studies of work methods in institutions like libraries is commonly known as work simplification.<sup>31-37</sup> This too uses a number of different means by which to record the present operations; among them the flow of work diagram, the work count, and the process chart, alone and in combination, probably are the most useful and most relevant in public libraries.

The flow of work diagram consists simply of a paper sketch of the work area in question, with walls, desks, and other physical properties drawn to scale and with lines added to trace the course of the work unit or cycle under examination. In case the lines overlap, they are distinguished from each other by colors, numbers, or other symbols. Often the diagram notes the average duration of time taken for the work to move from point to point, and that spent at each spot at which it is at rest or in process, and also the nature of the operation performed at each station. This technique is obviously applicable to a study of cataloging routines,<sup>38</sup> and to the determination of the rearrangement of service areas in a building, since presumably the most heavily used sections should be near the entrance, other things being equal. The logical analysis of the graph so produced is not difficult if one is sure of the qualities it is desired to maximize. Presumably in the case of public library catalog departments, maximum output and a minimum of backtracking are desired, and much of value in this connection can be borrowed from the straight-line assembly system. Almost any use of a flow of work diagram is likely to result in some rearrangement of desks and files, if not in other measures to reduce transit time and distance and to combine operations previously carried on at different points.

The work count is simply a quantitative record of the frequency with which a given task recurs. Usually it is more profitable to study and revise those operations which are done most often than to spend a similar amount of time on those which are performed least often. Knowing the frequency of a given work unit is also helpful in deciding whether to continue it at all, or how drastically to revise it, and

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how far one task should be modified at the expense of others. Catalogers protest at some suggestions of simplified cataloging on the grounds that reference assistants will have to make good the omissions involved many times; this is clearly a question on which the work count is able to throw light. When combined with a record of the time spent by each staff member on each performance of each task, the work count is sometimes called a time study.<sup>39, 40</sup> Such records have been kept sufficiently often in public libraries to show by now that circulation work takes about one-third of the total staff time and cataloging about one-tenth.<sup>41</sup> A usual preliminary to the work count is the drafting of a complete list of separate duties in order to secure reliable, comparable, and discrete data; such a list is also useful in job analysis for the classification of positions. The work count is a simple technique, and also very flexible; its end product is relatively unimportant in itself, but most useful in combination with other tools.

The process chart is a graphic device which requires each separate step of a job or process to be described. It is usually applied to a task which has been identified by the work count or in some other way as an operation needing investigation. It can be drafted by the person who does the work in question, by someone else, or by a committee. Specially printed forms are available, but homemade ones may be equally effective. The process chart is probably the single most useful tool of scientific management for public libraries of whatever size, and for any type of work in them. Its value lies in the pressure it exerts on the investigator to seek answers to questions such as the following in regard to each separate step of a work operation: Is this step necessary at all, or could it be eliminated? If retained, is it best done at the present point in the cycle, or if transferred to some other place could it save backtracking, obviate an extra inspection, or be combined with some other operation? Can it be performed most suitably by the person now assigned to it, or by someone else? Can it be discharged most advantageously at the present physical point, or elsewhere? Can the step be simplified, or can the more difficult features be separated from the less difficult, or can it be mechanized or helped at all by the use of a machine or a prepared form?

The process chart utilizes certain mechanical features. Usually every step in a job can be classified as either an operation (identified by a circle), a movement (identified by an arrow), a matter of storage (identified by a pyramid), or an inspection (identified by a square). The appropriate symbol is checked for each step, and the number of

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**FLOW  
PROCESS  
CHART**

		JOB _____		PRESENT METHOD <input type="checkbox"/>	PROPOSED METHOD <input type="checkbox"/>			
		CHART BEGINS _____	CHART ENDS _____					
OPERATION	TRANSPORTATION	INSPECTION	RELAY	TIME — IN SECONDS	DISTANCE — IN FEET	5. WHY is it done this way — is there a better way — can conditions under which it is done be improved? 4. WHY is it done by this person — can someone else do it to better advantage? 3. WHY is it done at this time — is there a better time for doing it? 2. WHY is it done there — could it be done to better advantage elsewhere? 1. WHY is this done — is it necessary — can it be eliminated?		
						IS THIS PROCESS OF JOB NECESSARY <input type="checkbox"/> OR CAN IT BE ELIMINATED? <input type="checkbox"/>		
OPERATION OR STEP					REMARKS			
1	2	3	4	5	6	7	8	
9	10	11	12	13	14	15	16	
17	18	19						
<b>SUMMARY</b> <input type="checkbox"/> OPERATION <input type="checkbox"/> TRANSPORTATION <input type="checkbox"/> INSPECTION <input type="checkbox"/> DELAYS					PRESNT IND. TIME	PROPOSED IND. TIME	DIFFERENCE IND. TIME	
					SEC.	SEC.	SEC.	
					FT.	FT.	FT.	
					PREPARED BY _____			

FIGURE 1: Flow Process Chart \*

\* Chart prepared by the Bureau of Business Management Service, College of Commerce and Business Administration, University of Illinois.

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checks of the four kinds totaled. Figure 1 illustrates one simple and typical form for a process chart.

In addition the distance the work moves and the length of time it is at rest are recorded. It is surprising that even the simplest job, when so charted, may show correctible delays or movements. Often one is not aware of the number of inspections to which a task is subjected, and these are usually time-consuming and expensive. Furthermore, the process chart technique demands of the investigator that he record his answers to the questions posed above. What may seem justifiable in thought to one person sometimes appears less so to himself and to others when presented in writing. Finally, process charting begins with the record of the present job but also includes analysis and improvement of the present procedure.

By definition, analysis of the flow of work diagram, of the work count, and of the process chart is a logical, subjective, and creative procedure. Persons of insight and imagination will make more and better suggestions than persons of limited vision and ability. But there are a few general principles to help. One of these is that any complex operation is made up of many individual steps, some of which at least are likely to be simple, requiring little knowledge or discretion, and possibly even can be mechanized. The success of the Training Within Industry program in the last war rested on this principle. A good general second principle is that any operation if continued long enough gets encrusted with steps once necessary and desirable but no longer needed or useful. The work analyst should always seek the real reason for the retention of each individual stage and then scrutinize that reason critically. All too many jobs are still performed in public libraries, as in other institutions, public and private, for no other reason than because they have always been done that way and no one has thought to take a fresh look at their necessity. Far more effective and desirable in scientific management than mechanization or standardization may be omission of a whole step or of a part of it. The situation is similar in the perpetuation of report forms and other documents in common use.

This leads to a third general principle, that of the calculated risk.<sup>42, 43</sup> The principle of the calculated risk is that some things are to be left undone, not because it is known or thought that the resulting product never would be used, but because it is known or thought that the product so secured would be utilized less often than would justify the cost of the operation or because it is desirable to get the result in some

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other way. Librarians have been peculiarly intent on leaving nothing to chance, on providing for all possibilities equally well, and thus on burdening themselves with an apparatus the parts of which differ greatly in their frequency of use and therefore in their cost per unit of application.

A fourth general principle is standardization. The genius of American industrial production rests basically on the principle of standardization and interchangeability of parts. So too, in analyzing the record of work in a public library, the analyst will do well to seek for those steps or processes which can be standardized, combined, substituted one for another, interlocked with each other, or treated in other ways to avoid unnecessary repetition and hence to save time, effort, and money. The use of a multiple-part order form is a simple adaptation of this principle, but the principle can be carried much further in public libraries than is now the case in even the most advanced ones.

The revision of a process is the third step in the basic pattern of all techniques for scientific management as applied to work operations. The first step in that pattern is to record the present practice; but whereas the second step is one of analysis and induction, this third step is one of synthesis and deduction. In effect the third step invokes the investigator's best judgment as to what can be done to improve the present procedure in the interest of any desired result, such as economy of cost, maximum output, efficiency of effort, or precision. It is at this point that the most fruitful contribution can be made by the outside expert who has seen how other comparable or related situations were handled and who is acquainted with the many approaches possible.

For practical purposes, however, a librarian can perform this step reasonably well, with a little study and thought. For one thing, there are in books on library shelves much of the guidance the analyst relies on. Again, their professional literature is bringing to the attention of librarians the devices found to be most successful in libraries and in other settings. Finally, the outside expert as well as the librarian can make at best only a judgment as to whether and how much a given change will improve a work process; the expert should be more often right than the nonexpert, but even the expert will be in error at times. And it is possible for the librarian to make his guess in advance on paper, scrutinize it, and subject it to the criticism of his colleagues, before he puts it into effect. This, in fact, is the last step in the use of

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the process chart, viz., a proposed revision of the separate steps of the job, with the new totals of operations, movements, delays, and inspections.

One of the most dramatic ways by which to improve a public library work process is to mechanize it, but mechanization often is not as effective as other devices or as economical in cost. Public libraries have moved a long way in mechanization in even the last ten years or so, and we are probably still far from seeing the end. But it would be a serious mistake to think of mechanization first or uncritically. Machines are expensive to purchase and often to operate and maintain; their obsolescence and depreciation tend to be higher than we realize; for best results they demand more severe standardization than we are yet prepared to make; their very installation tends to perpetuate a process that might otherwise be even more drastically modified or completely eliminated—to mention but a few objections.

Even after these cautions, however, there still is much room for the use of machines in public libraries. The most important advances have come in the broad field of documentary reproduction, through microfilming and microprint; in photographic charging and the photo-clerk;<sup>44</sup> in the use of the multilith, Elliott stencils, and addressograph slugs for the reproduction of catalog cards; in sound recording by tape, wire, disc, and phonorecord, as utilized for plays, poetry, speeches, letters, music, and discussions; and punched-card equipment for circulation, cataloging, and other uses. Automaticity of course is the nth degree of mechanization; but there also is a large place for the application of small machines or just "jigs," fixtures, guides, or other physical devices, to lighten labor and to produce a better product. Examples are the electric gluing machine, the electric typewriter, the Embossograph lettering machine, and power tools for the custodian.

Another important way in which proposals for the revision of a work operation is likely to find expression is the recombination of component steps in time and space. Thus the precataloging of books, prior to their receipt and solely from their listing in bibliographical sources, is neither new nor without merit. Insofar as possible, materials should flow in a straight line. This demands a rigid sequence of operations and a coordinated flow of supplies; it also allows for sub-assemblies and for specialization of function and of mechanical equipment. Even relatively simple administrative tasks, such as preparing a purchase order, can be improved by thought for the right sequence

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of steps and the presence of proper documents at the proper time.<sup>45</sup> It is this type of thinking, expressed through flow of work diagrams, which leads to rearrangement of desks, files, machines, and people. In another sense, the physical recombination of component steps may express itself in stripping away from branches or other agencies for public service whatever job processes can be centralized and handled en masse in some nonpublic department. Instances may be the application of cellophane covers to books, the handling of overdues, as is possible in any transaction number system of circulation, and the use of a typing pool.

Yet other measures by which work operations in public libraries often can be improved are the retraining of employees and upgrading of their duties. In many public libraries, assignments are determined on the basis of completion or noncompletion of a formal course of study. But many duties performed by library school graduates can be discharged equally well by persons lacking such preparation. This is a familiar point to librarians, but scientific management is concerned with it too. Impressive economies and increases in output can be achieved by making the best possible adjustment of job to individual ability and by using the most skilled and knowledgeable persons, not for what can be done as well by others, but for training those others, inspecting their work, making complex and delicate decisions, and similar tasks. In the same spirit, constant attention should be given to the possibility of upgrading the duties of every worker in order always to close the gap between the best that he can do and that which he is asked to do. This in turn rests on in-service training, which is likely to be most effective if it is closely tied in with actual work processes. In these and other ways, the analyst seeks to devise a better method for doing a job than has been yet found or used.

*Some Future Possibilities*

This has been a very brief review of the nature of scientific management and of some of its main techniques so far as applicable in public libraries. It is hoped, however, enough has been said to justify in some measure the following suggestions as to the most important possibilities in the applications of scientific management to such agencies. The first is recognition of the great benefits to be derived. The second is that there is a clear trend toward making such applications. Third, the technique deserving to be most widely utilized is the

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controlled experiment. Fourth, the area chiefly calling for investigation is that of service to the public.

It is easy to think of reasons public libraries in the past have made relatively little use of scientific management. Most of them have been small; they have had many other and more pressing problems; and their administrators have been unfamiliar and unsympathetic with the scientific approach. But today there are several hundred public libraries which are big enough to warrant widespread applications of scientific management. And the profession is so well developed that an idea found good in one library is likely to be picked up and copied over the country and indeed abroad. The total annual circulation of books by American public libraries is about 350,000,000; if the process of charging and discharging a volume can be satisfactorily revised so as to eliminate even one step, the saving is impressive. Today there are half a dozen systems which greatly reduce the discharging process, and indeed it is not too much to say that any public library which continues to "slip" returned books is inefficient at this point.

But the need for scientific management in public libraries, and the benefits potential in it continue to be great. All that we have done so far is to scratch the surface, and to demonstrate that the application of certain techniques is possible. In the circulation process, for example, we still handle thousands of entries, even under a transaction number system, simply in order to have the appropriate information available for the 5 per cent or so of the loans which become overdue. Someone is going to change that someday, and release an army of employees to assume more important and more difficult duties for which there never has been time.

Not only is there a need for such drastic renovations, but it is increasingly likely that librarians themselves will be making them. Just as it is easy to see why public libraries have done little with scientific management in the past, so it is easy to see many indications of a new trend. The Graduate Library School at the University of Chicago since about 1930 has emphasized the use of the scientific method in librarianship; the great depression of the thirties forced reconsideration of many practices; the personnel shortages of the war period helped in the same direction; many library schools today teach the principles of scientific management; a number of public libraries have been subjected to management surveys;<sup>48</sup> and the professional journals have brought developments in this area to the attention of librarians.

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Perhaps the most important reason for the new trend is simply that librarianship has moved generally into a new stage. The early days of the profession were marked by a concern with the development of techniques, and extension work and diffusion of service in general marked the first part of the twentieth century. In the long present the concern seems to be ever more with the proper and effective functioning of the library in the light of current needs and problems. Thus "books" has come to include all forms of print, films, slides, phonograph records, wire and tape records, and other media of communication. And some of the customs of yesterday, such as the use of accession books and the keeping of records of circulation according to Dewey's classes, are being dropped in many libraries. In such a time of change, it is natural to question all operations, and scientific management is par excellence a tool through which existing practices are called upon systematically to justify themselves.

We can and should borrow all that is known about scientific management from the experience of other institutions. But for the fullest development of its application to the problems of public libraries, and for the production of new devices and methods peculiarly suited to public libraries, the one most powerful tool available is that of the controlled experiment. Variations of the term experiment are found frequently in library literature, but few applications of the experimental technique in any rigid sense in public libraries are known to this author. By a controlled experiment is meant ideally an exact comparison of two situations known to differ in no regard other than the presence or absence of one variable. In the physical sciences this end often is achieved; in the social sciences, it is surprising how close we can come to achieving it.<sup>47</sup>

The value of the controlled experiment is that it not only tells us whether a particular device "works," i.e., produces certain desired results, but, more nearly than any other tool, it tells us why. Most public librarians are probably prepared to agree that a summer reading club is desirable for children. But why is it desirable? Well, possibly one reason is that summer book reading induced by a club helps a child retain from spring to fall what he has learned of vocabulary and spelling. This may very well be so, but a controlled experiment to test it would be relatively easy to set up by administering appropriate examinations to a group of school children in the spring and in the fall, and then comparing the scores achieved by members of the reading club with those of the rest. This example illustrates that the

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controlled experiment tells us why something happens only if we hypothesize in advance the correct explanation. It should make us stop and think if reason after reason, so hypothesized, fails to check with the facts observed.

So, as the last consideration here, it may be noted that the service operations of public libraries, devoted to bringing readers and "books" together in meaningful ways, are today probably more in need of attention than are lines of work which are being attacked, through the application of the principles of scientific management. Of what avail is it to reduce the number of steps in the circulation process, if we still don't know what happens to the reader who borrows *Native Son*, or why it happens? What gain is there in turning out catalog cards quickly if we fail to ascertain what information our patrons want on the cards, and why? In what way is it creditable that we can measure the unit cost of answering a reference question if we don't know what difference, if any, it made to the patron to get the information?

These, of course, are hard questions to answer. But their difficulty is matched only by their importance. Until we begin to apply the methods of science to questions such as these, our uses of scientific management remain at the threshold of what is really important. And the most powerful tool likely to be of aid to us in this connection is the controlled experiment.

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## Scientific Management in Research Libraries

LAURENCE J. KIPP

TO JUDGE FROM THE information found in library literature, the application of scientific management to research libraries has been scattered, uncoordinated, and in many instances has represented an unconscious acceptance of management principles. Most articles useful to a study of this topic treat only one small aspect of it, or indeed contain no more than inadvertent comments upon it. There are, however, four items of great usefulness. Because these are basic, and available to librarians, they help to cast the form of the present study. Two are by Donald Coney, the first<sup>1</sup> having been an attempt in 1930 to show the application of management theory to research libraries, and the second<sup>2</sup> a recent factual study of management practices in research libraries. Different though they are, they offer an excellent summary of the effect of management points of view and practices in research libraries, from the tentative application of theory in 1930 to the rather widespread utilization of 1952.

An article by Paul Howard,<sup>3</sup> perhaps the most basic treatment of this topic, was published in 1940. It is a thorough academic exploration of the functions of management. In a fourth article,<sup>4</sup> Ralph Shaw has stated the position of a librarian who has consciously adopted management practices and has had long experience with them. His description of the operation of management procedures in a library is the most graphic article now available.

The present attempt, then, rests upon the theory and application expressed in the articles by Coney, Howard, and Shaw. And, since other articles in this issue of *Library Trends* carry reports of specific applications of management techniques, the present one aims to offer a large-scale review. It tries to present evidence of the employment of the techniques of scientific management during and even before

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the 1920's, to indicate how they came to be introduced, and to provide specific examples of adoption in research libraries. The influence of such applications upon the dollar expenditures, the programs, and the personnel of these libraries are not, at this point, measurable, but effort is made to indicate some probable effects.

This statement leaves to others the task of defining precisely the scope and the elements of scientific management. It adopts Coney's description of the field as "generally identified with the last four decades, beginning with F. W. Taylor and time-and-motion study and ending—for the moment—with 'operations research.' Management is a broad area with a vague configuration. . . . Information at hand shows that management in college and university libraries gathers around the focuses of personnel, work measurement, costs, machines, and plant. 'Organization' [is] often considered a part of management. . . ."<sup>2</sup>

A complete list of the observable phenomena that characterize the application of scientific management to research libraries would be lengthy. It may suffice here to point to a few. In any library where the principles of scientific management have been applied in significant degree, the following phenomena will be present:

1. Attempts will have been made to determine standards of performance, whether of books ordered, cataloged, or circulated, or cards typed or filed. Specific operations will have been timed, and staff and individual averages arrived at. Standards may have been established through elaborate time and motion studies or through simple means, but such determination will be an accepted role of administration.

2. Partly as a preface to the determination of standards, and partly as a result of it, the work of each department of the library will have been clearly defined. This facilitates the measuring of accomplishment, places responsibility for it, and immediately affects the hiring and assigning of employees. Thus, the tasks of professional catalogers will be defined—and no doubt separated from those of order clerks, typists, and reference workers, although the process need not, of course, preclude the delegation of reference duties, for example, to a cataloger.

3. Such approaches to library work require concerted planning, and it is observable that the closer a library administration gets to the viewpoint of scientific management, the more important planning becomes, and the more clearly it is separated from the execution of

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policy. One or more planning groups are set up and meet with the chief librarian to define and measure achievement. Assistants—often with staff rather than line assignments—gather data for the consideration of such groups.

4. Personnel policies are codified as rule-of-thumb measurements are replaced by more definite standards, and personnel work is centralized in one office. The staff of that office grows rapidly—at least to a point—and as rapidly assumes greater status.

Now some of these phenomena might well have appeared in our large and complicated twentieth-century libraries if scientific management had never been heard of. Since, taken together, they form a pattern consonant with the theory of scientific management, we shall assume that they result from the adoption or adaptation of that theory. The manner and extent of that adoption or adaptation now will be explored.

Howard has cited evidence from library literature of early approaches to a management point of view. The first appears late in the nineteenth century in statements urging upon librarians a business-like attitude to library costs. Two episodes in library history are here added to Howard's account, because they so clearly indicate the gradual development toward a point of view in accord with scientific management.

Issues of the *Library Journal* in 1892 carry a series of communications from C. C. Soule, a trustee of the Brookline, Massachusetts, Public Library, concerning the management of the Boston Public Library, then being administered by the Board of Trustees rather than by a librarian.<sup>5</sup> Soule's comments upon the duties of a library executive, and upon the relation of that officer to technical matters, to his board, and to the public, and his suggestions upon the proper method of planning a building suited to a library program, are still biting, sensible, and fresh. He implies that such a consistent group of theories had been developed "during the last quarter of a century . . . [by] earnest, enthusiastic, and practical men, who believe the library to be one of the greatest factors in modern civilization."<sup>6</sup> Whether or not Soule derived his ideas from librarians, it is clear that by 1892 librarians had been treated to an exhibition of practicality, analysis, and insight such as later scientific managers might envy.

There are, until the 1920's, few additional comments from or about research libraries that stand the test of time and reveal the point of view of management. Public librarians were more vocal and presumably

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more active, and, of course, affected the thinking of research librarians. From 1911 to 1913 the Committee on Library Administration of the American Library Association undertook—at the insistence of Arthur E. Bostwick of St. Louis, Missouri—a survey of library procedures. Bostwick's approach was interesting. He stated, "The scientific position that the first thing to do, in making an investigation, is to find out the facts, has only recently been taken in work of this kind. . . . It is now generally recognized that we must have a Survey—an ascertainment and plain statement of the facts as they are—as a preliminary to action or even to discussion."<sup>6</sup>

Measuring the facts turned out to be difficult, because they were neither simple nor uniform; and translation of the results seemed hopeless.<sup>7</sup> Nevertheless, a first conscious attempt had been made—during the same years that F. W. Taylor's views were gaining wide publicity, it may be noted—to apply the methods of scientific management to libraries. Clearly, the task was to adapt such methods, rather than to apply them directly, to library problems.

The necessary adaptation of course was slow. To judge from the paucity of material in library literature, it was delayed especially in research libraries, perhaps because the tradition of scholarship and gentlemanliness often excluded ideas originating in industry or business. But the lack of literature on the subject may be somewhat deceptive. The tradition of the scholar and the gentleman produced great libraries; it also produced at least a few early applications of management methods.

Definite contributions had been made before 1930 by management experts—whether or not they knew themselves as that. One of the most striking examples is the work of T. F. Currier, assistant librarian at Harvard in charge of cataloging from 1902 to 1940. Since Currier published sparingly in the library field and worked almost exclusively with his colleagues at Harvard, his contributions have not been fully appreciated. In a paper read in 1918,<sup>8</sup> he speaks of cost reductions "resulting from the application of some of the essentials of efficient management." He notes the necessity of "formulating correct ideals of work, care in selecting and training assistants, correct supervision and flexibility of organization." He advises that, "We must study carefully the cost of production, take advantage of every method that leads to economy, prune away with ruthlessness each process the value of which we cannot prove." Economy, he concludes, will be achieved "by building up a habit of efficiency and a common sense view of

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relativity in the importance of work. This can be attained best by raising the tone of the catalog staff through careful selection and training of assistants, by formulating the ideals and aims of our work, by training our supervisors in the principles of management and by promoting flexibility of organization within and between departments."

As a pioneer management expert in his field Currier contributed to Harvard a cataloging system which has consistently produced results at lower unit costs than have prevailed in most large research libraries. He sharply differentiated between professional and clerical duties, setting up a typing section and a searching section<sup>9</sup> which operate efficiently today. His "common sense view in the relativity in the importance of work" led him to policies of simplified and selective cataloging which are still largely valid. At one point Currier and his colleagues made a detailed study of the use of the catalog, discovered areas where subject cards were necessary and where they were dispensable, and formulated rules which are, with minor modifications, still applied at Harvard.<sup>10</sup>

Thus Currier, in the decade before 1925, had based a program upon analysis of work procedures, careful selection and training of personnel, determination of unit costs, and relative importance of each procedure to the program of his institution. Certainly, however, Currier was no doctrinaire management expert. So far as can be determined, he was reacting pragmatically to the problems created by rapid growth of a great library. This might indicate—and perhaps many other examples would testify similarly—that the principles of scientific management are not eclectic, nor need their application be doctrinaire.

It is not easy to move from the specific to the general and to discover how and why management techniques were generally introduced into research libraries. However, such explanation is urgent if the importance of management is to be evaluated, and some suggestions are offered here.

In part, the ideas which characterize the concept of management have seeped into libraries from business and scientific developments. As early as 1887 the librarian of the St. Louis Public Library maintained that "the duties of a chief executive of a library differ in no essential from those of a manager of a stock company carrying on a commercial enterprise."<sup>11</sup>

The effect of scientific and technical developments has been more

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recent, but may be more significant. Microphotography, the recording of data on punched cards, and the measuring of intelligence and aptitudes, for example, have brought scientific techniques into research libraries. In addition, the tremendous growth in the literature of the sciences has thrown new demands upon libraries. As one scientist, J. D. Bernal, has said of libraries: "We have come to realize that the unity and complexity of science has grown to such a degree that the library and information service has become a key to conscious progress along the whole front of advancing knowledge. For it to be effective . . . library service should change from what might be called a negative to a positive activity. . . . The modern library should be a distributor and organizer of knowledge."<sup>12</sup> Now, management of scientific literature develops, almost inevitably, in the pattern of scientific management. It is significant that the most conscious and deliberate attempt to use the principles of scientific management in research libraries has occurred in the Department of Agriculture Library, which operates such a "positive" program as Bernal has called for.

Management practices also have been adopted pragmatically as collections in all fields have grown and as demands for services have increased. Currier typified the realistic attitude when he stated, of one cataloging practice, that, "it is a bit illogical, but it is practical."<sup>13</sup> That statement aptly describes many innovations in research libraries. Pragmatic reactions to burgeoning problems are responsible for such departures as the New England Deposit Library, the Midwest Inter-Library Center, the series of regional bibliographical centers, and the various undergraduate libraries. These developments involve more than management theory, of course, but each such novelty has included the application of management dicta: detailed consideration of the program presented; measurement—so far as possible—of various alternatives to meet that program; planning to eliminate waste; and use of mechanical tools wherever they can lower unit costs.

In some instances librarians may have been less responsible for the adoption of management practices than the administrators above them. Centralized personnel work and purchasing and accounting have, for example, been introduced into many universities by management experts. Inevitably, these men have forced libraries to adopt some management usage, though sometimes belatedly.

Pressure from the top to introduce management practices has been felt acutely in federal libraries. As a consequence, the large Washington libraries have often provided pilot demonstrations. The Library

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of Congress, because of its size and its relation to the government, has consciously developed many management applications, particularly since World War II.<sup>13</sup> Likewise, the Department of Agriculture Library has sought in recent years to meet its large national obligations by continuous emphasis upon such procedures.<sup>4</sup>

Scientific management, then, has been introduced into libraries because business methods have been adopted, technical developments have brought with them the scientific point of view, librarians have reacted pragmatically to the pressures of increased collections and for augmented services, and administrators in universities and in government—particularly the latter—have forced librarians to adopt modern methods. Some of the methods described by Coney and some of the techniques revealed in the table of contents of this journal are now found in every research library. Points of view comporting with management may not dominate, but they certainly influence, the thinking and action of every library administrator. It is impossible to go further in estimating the extent to which scientific management is now practiced in research libraries. A study of the problem, based upon a check list of library practices, might provide valuable data for further work in the field.

Just as there is little precise information on the extent of the practice of scientific management in research libraries, so is there scant data as to the effect of such methods upon the expenditure of dollars. In a few instances exact costs and exact savings can be measured. The report on the photocharger experiment in *The Use of Photography for Clerical Routines*<sup>14</sup> is an example of such measurement. Studies of cataloging costs are baffling, but at Harvard—and no doubt in other research libraries—the application of management practices over a period of years has undoubtedly saved hundreds of thousands of dollars.

In any study of dollar costs it must be borne in mind that they are so closely related both to methods of management and to program development that, even in a limited operation, it is difficult to ascertain the exact share of either. Demands upon research libraries have multiplied during the same period that practices of scientific management have been adopted. Dollar costs are therefore deceptive and usually meaningless. At Harvard, for example, the library budget has been expanded to care for the operation of the Lamont Library for undergraduates. That library is an example of a building planned with extreme care to fit a program of instruction, to augment other library

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resources, and to be economical in operation. The physical arrangement of the building, the simplified cataloging, and the self-service features are widely regarded as models. If, as is here contended, the practices of scientific management contributed to the efficient planning of that building, their value must be measured subjectively rather than in dollars. Most other developments in libraries are equally difficult to evaluate in terms of money.

It is, of course, true that the management operations which save money are more apt to become known than those which prove expensive. It is even more likely that the cost of some operations will be hidden, and that only partial results will be divulged. Practices of scientific management are not cheap to apply, and they are easy to misapply. It is remembered at Harvard that an attempt in the late 1930's to draw conclusions from a time and motion study at the circulation desk of the Widener Library proved worthless, perhaps because of the rigid application of gauging devices to a situation too complex to be so measured.

Wherever scientific management is practiced it requires one or more persons trained in its application, investment of a great deal of time in planning, retraining of the staff, and often modifications of physical arrangements and purchase of new equipment. The attendant costs, and they are frequently heavy, may be met by direct savings; more frequently, perhaps, they can be justified only if they contribute significantly to the program of the library.

The problem of money costs is closely related to that of efficiency, if not identical with it. Dwight Waldo, in his *Administrative State*, a detached, sometimes ironic, study of governmental management, summarized one attitude toward the cult of the "efficient." ". . . it would seem," he writes, "that the 'pure concept of efficiency,' . . . as the basic 'good' of administrative study, is a mirage. For is not the ultimate question 'Efficient for what'? Is not efficiency for efficiency's sake meaningless? *Is efficiency not necessarily measured in terms of other values?*"<sup>18</sup>

The effect of the point of view of management upon program development in research libraries is, of course, even less susceptible to measurement than the dollar cost or dollar savings. With its emphasis upon constant scrutiny of existing practices and constant planning, scientific management emphasizes a dynamic interpretation of each individual library program. Perhaps the most striking illustration of the rather general adoption of management points of view is found in

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the planning of buildings to house research libraries since World War II. Such libraries as those of Princeton University, Massachusetts Institute of Technology, Harvard University, and the universities of Iowa, Minnesota, California, and California at Los Angeles have built anew or added to their physical plants. Common features are to be found in such buildings, but the variety is great and bewildering unless one sees each structure in relation to the growing program of each university. Again, scientific management is not responsible for these edifices, but it has contributed its methods to the planning of details and operations.

Scientific management does not, of course, determine a library's program, but it emphasizes that procedures employed must be consonant with that program. A minor example may illustrate this. In the late 1930's the Widener Library at Harvard was the first to adopt punched cards for circulation use. This was done after careful study, and the results were satisfactory. By 1949, however, the library no longer was under the same obligations so far as circulation records were concerned. The punched cards were therefore discarded in favor of a still simpler charge card. The change was misinterpreted by some librarians as a failure of the punched-card system.

Whether library staff members have benefited from scientific management depends, of course, upon individual points of view. However, the emphasis being placed in almost every large library upon an active personnel office indicates at least an increased awareness of problems relating to the staff. In the past twenty years experts in scientific management have put less emphasis upon mechanical means of increasing production and more upon discovering the potentialities of human beings. One quotation from a work by Elton Mayo, a leading practitioner and theorist in the field, will indicate the broad considerations upon which personnel practices are now—or soon will be—based: ". . . in a modern and industrial society ultimate decisions . . . must vest in groups that possess both technical and social understanding. This requirement does not by any means exclude workers. . . . an *adaptive* society cannot be controlled by any but *adaptive* persons. And this again implies a need for greatly improved concepts of training and education, and equally improved methods."<sup>16</sup>

Such thinking incorporates humane considerations which were not present in earlier theory of management. In the research library field an excellent example of the newer attitude is found in an article by E. B. Stanford on supervision.<sup>17</sup>

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Another evidence of the greater consideration given to administrator-staff relations is the multiplication of staff newsletters. Such publications, infrequent ten years ago, are now used in various large research libraries to inform the staffs of activities in their institutions, to build *esprit de corps*, and to make the work being performed meaningful to those who are doing it. It would be interesting to know how many members of the Association of Research Libraries now issue such newsletters.

In summary, it can be said that scientific management has greatly affected research libraries, though not much has appeared in print about the developments involved. Research on both large and small topics concerning scientific management in these libraries would help to determine the extent and the value of the practices employed. Many adaptations of the dicta of scientific management to research libraries have been made as twentieth-century reactions to twentieth-century problems, rather than as conscious applications of those doctrines. They have been of great value to the libraries, at least in some cases. The greater emphasis placed by experts in scientific management upon relating management practices to program development, and upon humane development of staffs, is reflected in research libraries.

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## Time and Motion Studies in Libraries

RICHARD H. LOGSDON

THE ESSENTIAL elements of time and motion study and flow chart analysis are commonplace, and it is doubtful if any reader of this journal has failed to make use of them both in his work and in everyday living. In fact, librarians before and since Melvil Dewey have devoted a fair share of time, effort, and pages of literature to finding and reporting more effective ways of getting work done. The literature of library architecture, to cite one example, is concerned basically with promoting building plans which save the time of staffs in receiving, cataloging, and preparing books for the shelves, and of both staffs and readers in the use of those books.

Formal motion and time study, however, goes somewhat beyond the concept of work simplification and streamlining of processes. One author<sup>1</sup> lists four distinct parts to the process, namely, (1) finding the most economical way of doing the job, (2) standardizing the methods, materials, and equipment, (3) determining accurately the time required by a qualified person working at a normal pace to do the task, and (4) assisting in training the worker in the new method. The different parts may be considered separately, but must all be taken into account in utilizing this form of management control and improvement of performance. While library literature contains many examples of cost studies and reports of time devoted to different phases of the library operation, there has been almost no application of time and motion study technique in the formal sense.

Joseph L. Wheeler<sup>2</sup> credits Emma V. Baldwin and W. E. Marcus<sup>3</sup> with the first industrial motion study process chart to appear in library literature. Their study, published in 1941, was designed to establish measuring rods for the evaluation of library service. Deductions and conclusions are based on data from thirty-seven public libraries, reporting the experience of 1,560 individuals in the daily performance of work for a four-month period. It is a time study in the sense that

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the apportionment of staff time to the major functions of library service is presented.

The process chart itself, prepared by Martha Gilbreth, shows the typical route of nonfiction books through the cataloging department of the Montclair Public Library. Lillian M. Gilbreth, management engineer, was a consultant for the study. The Gilbreths, known widely in recent years through the best seller, *Cheaper by the Dozen*, developed motion study as it is known and applied today.<sup>4</sup>

The first formal motion and time study of a library routine reported in the literature followed shortly in 1943, and was conducted by D. D. Battles, Howard Davis, and William Harms.<sup>5</sup> This was carried out at the Bradley Polytechnic Institute under the direction of Marvin E. Mundel, with the assistance of Arthur M. McAnally, then librarian at the institute. It concentrated on one part of the circulation routine—loaning a book to a patron. Techniques included micromotion analysis with motion pictures, a microchronometer, motions broken down into therbligs (Gilbreth spelled backwards), and a simo chart (simultaneous motion chart). The study showed the possibilities of reducing the time required in the process by at least 35 per cent through such changes as (1) simplification of card files; (2) rearrangement of books to place heavily used groups near the loan desk; (3) rearrangement of date-due slip and pocket; (4) rounding of corners of book cards; and (5) redesign of date stamp. Reduction of fatigue was stressed as one of the main objectives of motion and time study. Attention was given also to lighting, temperature, and control of ventilation as factors affecting work performance.

Six years later Jewel C. Hardkopf<sup>6</sup> reported the results of applying methods and motion techniques to the processing of books for circulation at the New York Public Library. Over and above presenting findings, this report is of interest for (1) reviewing the historical development of methods and motion study; (2) analyzing the techniques used; and (3) reviewing previous reports on methods and motion studies as applied to libraries. Referring to the work of Battles and his associates at the Bradley Polytechnic Institute, she says: "This approach . . . should have opened a new era in the realm of library housekeeping. But there is nothing more in library literature to date [1949] about further application of methods and motion techniques to library processes."<sup>7</sup>

The absence of reports of formal studies, however, does not mean that librarians have made no use of the principles and techniques in-

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volved nor that developments in business, industry, and public administration have been ignored. Felix Reichmann's survey of the literature dealing with cataloging costs<sup>8</sup> traces this concern of librarians in one area of library operations mentioning among other studies the work of the American Library Association's Committee on Cost and Method of Cataloging (1914) and Robert A. Miller's doctoral dissertation,<sup>9</sup> which involved a detailed analysis of time spent in various steps of the cataloging process.

The Training Within Industry program of the War Manpower Commission during World War II deserves special mention. Its aim was to increase productivity through good use of manpower. Its influence resulted in a number of articles, including those by Frances C. Gates,<sup>10, 11</sup> Margaret R. Meyer,<sup>12</sup> Edward C. Heintz,<sup>13</sup> and more recently Joseph L. Wheeler,<sup>2</sup> which urge more interest on the part of librarians in work simplification and its various ramifications.

The contribution of the editor of this issue of *Library Trends*, Ralph R. Shaw, stands out in recent years. He has influenced librarians' interest in management techniques in all of their aspects in at least three ways: (1) by personal research and applications at the Gary Public Library, the Department of Agriculture Library, and in surveys; (2) by development of machines; and (3) in teaching, participation in conferences, and personal association with colleagues. His report on the development of continuous phototyping<sup>14</sup> is an excellent example of analysis and research on a specific problem, combined with experimentation and the development of cost-saving processes and equipment. The end result was a 50 per cent reduction in the charge made for this service. His "Scientific Management in the Library"<sup>15</sup> presents a general overview of his approach to management techniques as applied to libraries. Robert F. Price's study,<sup>16</sup> conducted at the Beltsville Branch of the Department of Agriculture Library, serves to illustrate the time analysis method of estimating man-hour requirements for repetitive library routines.

Many library surveys, particularly those in recent years, have given attention to work simplification, improved flow of materials, and work measurement. Some have even made formal use of flow process charts. Reports of the Los Angeles survey,<sup>17</sup> for example, include data on distribution of staff time by functions and recommend a work measurement program as a tool for managerial and administrative control. Process charts, not published in the survey reports, were prepared in connection with a work simplification program.

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Wheeler's survey of order and cataloging department policies at the San Diego Public Library<sup>18</sup> included before-and-after motion charting and diagramming of the clerical processes, although the charts were not published. Over-all savings from recommendations were estimated at \$1,500 to \$2,000 yearly in a relatively small operation.

It is quite understandable, therefore, that the Public Library Inquiry should have devoted staff attention to time and work unit measurement. The full title of the report prepared by Watson O'D. Pierce<sup>19</sup> is significant: *Work Measurement in Public Libraries; a Review and Manual on Time Studies and Work Units with a Statistical Analysis and an Evaluation of Administrative and Management Procedures in Certain Public Libraries*. The study presents a mass of data and interpretation commensurate with the somewhat extended title. Reference to Part II (chapters 4 and 5) will serve the purposes of this paper. These chapters describe in detail how time measurements can be made by the staff of a public library, and together form a manual of instructions in carrying on time and work unit measurement. They describe preliminary stages of training and preparation, the orienting of library personnel to measurement studies, and the method of analyzing the results. Report forms are included.

Recent surveys of the New York Public Library by the firm of Cresap, McCormick, and Paget represent the most extensive and detailed analysis to date of technical processes in a major research library. Two studies cover acquisitions and preparations, respectively, giving attention to organization, staffing, management controls, methods (including flow of work), and such physical factors as location, layout, and furnishing. Librarians interested in some of the more specific accomplishments of these studies are referred to the articles by T. D. Morris<sup>20</sup> on acquisitions and R. E. Kingery<sup>21</sup> on preparations.

While Miss Baldwin and Marcus are credited with the first process chart to appear in library literature,<sup>3</sup> it was used only for analysis and description, and was not accompanied by any attempt to show how the procedure might be simplified. It was not until 1952, in the survey of the Houston Public Library, that H. H. Young<sup>22</sup> used this technique to show first the actual route of the order card from preparation by the division head to final filing (twenty-eight steps), and second, the proposed simplified plan which reduced the route to eighteen steps. The charts employed symbols based on N. N. Barish's work<sup>23</sup> showing "Operation, Transportation, Inspection, and Storage."<sup>24</sup> Time

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taken at each stage is not shown, however, so no estimates of savings are presented.

Published literature represents perhaps only a fraction of the management activities being carried out in libraries in general and with special reference to work simplification. The work being done at the Brooklyn Public Library under Francis St. John, for example, is reported only in a general way.<sup>25</sup> Jewel Hardkopf, whose thesis has been mentioned, devotes full time to studies of internal operations and procedures at Brooklyn. The photoclerk experiment undertaken in 1952 drew upon the experience of staff members in twelve libraries and stimulated research and study of various procedures in the cooperating institutions. The University of California Library at Berkeley supplied several significant examples of flow charts based on work done there, both in relation to internal operations and in connection with the development of the standard interlibrary-loan form. The Detroit Public Library supplied a floor plan of the Binding Department layout, showing the flow of work through the Department. Alma Jacobus<sup>26</sup> described the use of work flow charts at the 1950 meeting of the Special Libraries Association. Carolyn Hale<sup>27</sup> reports the work simplification clinic held at the University of California School of Librarianship, Berkeley, which included presentation of the Gilbreth method of process procedure analysis, while the Library of Congress has produced a sound film, "The Flow Process Chart and How to Make It." Several theses bearing on the subject have been reported from the University of Illinois, but are unpublished.<sup>28-30</sup> Other items may have escaped this writer's attention.

It appears from the above information that the essential elements of time and motion study have been used by librarians in fulfilling management responsibilities. Going back to Barnes's four points, librarians have been interested, even if in varying degrees, in (1) finding the most economical way of doing jobs; (2) standardizing methods, materials, and equipment; (3) determining time required by a qualified worker to do a given task (i.e., the setting of performance standards); and (4) on-the-job training of staff. We have seen, also, that only the smallest beginning has been made in relation to the potential gains from application of the principles of motion and time study to library operations.

We know as a result of industrial experience, from Taylor on through the World War II period and to date, that research and study of methods, materials, and equipment pay tremendous dividends in

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increasing output per worker and in lessening fatigue. We know, too, that these same methods when applied to various aspects of library work produce comparable results in better service, lower cost, or both.

The conclusion might well follow that librarians by and large are failing to fulfill their management responsibilities in the area of applying modern techniques in general and motion and time study in particular. This writer would hazard that a jury hearing the evidence would bring a verdict supporting such an accusation. But rather than press charges against ourselves, it will be the purpose of the remaining paragraphs of this paper to suggest some of the more obvious ways in which librarians might proceed to be sure that adequate attention is given to time and motion techniques in the management of their libraries. This will represent one person's opinion, admittedly prejudiced because he has spent dozens of relatively unproductive hours checking and reviewing library literature on the subject.

The first suggestion ought not to be new for librarians, namely, to read a book on the subject, not from library literature but directly from the industrial engineering field. Any one of several possibilities will do, and standard bibliographical sources will produce their titles. Business managers were given this same advice by Burton Crane in his review of the Spriegel-Myers compilation of the *Writings of the Gilbreths*, published in the spring of 1953.<sup>31</sup> Speaking of the book, he says:

. . . it starts with rules issued by Gilbreth's firm of general contractors for pouring concrete, laying brick and breaking in apprentices. It proceeds through motion studies, elimination of fatigue and the other tools of modern management to incentives and the necessity of making each worker feel that he is a member of a team.

Today procedures recommended by the Gilbreths are followed by most of our larger companies but the underlying principles are too often on the dusty library shelves of a generation ago. A good many managers, whether in industry or selling, would benefit by the fresher course provided in this new book.<sup>32</sup>

The second suggestion is to place responsibility within the organization for making use of such techniques. In other words—organize and staff for the purpose. While the specific solution will vary with each library, all supervisors, including the chief administrative officer, should have a part in the program. Larger organizations may need a specialist position, but this does not relieve other supervisors of responsibility. Smaller organizations would do well to secure the assist-

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ance of a specialist on a consulting basis. As specific projects get underway, all staff members affected should be brought into discussions.

The third suggestion is to identify and to recognize similarities and differences in library operations in relation to the industrial activities for which time and motion techniques were developed. Such techniques normally apply only where the activity or operation is repetitive. An early paragraph in the report of the survey of the preparation procedures at the New York Public Library is particularly significant.

To the management analyst accustomed to the office routines and production techniques of business and industry, the preparation machinery of a large research library presents both a challenge and a fascinating field for study. Here one finds the customary exterior of a mass production office operation—files, forms, typewriters, and controls. But there the similarity largely disappears and a complexity complicated by strange terminology is encountered in almost every phase of the work. The concept of repetitive operation which is the keynote of economical mass production in business is strikingly absent in the Library because each new piece prepared may present new or unusual problems to the searcher, the cataloger, the filer and other assistants. In this respect, preparation exhibits characteristics more closely allied to those involved in manufacturing a custom-made product. As one becomes more intimately acquainted with the substance of cataloging, it is more readily apparent that preparation is not a series of simple clerical tasks but a professional undertaking requiring skills that only specialized training and experience provide.<sup>33</sup>

This statement should not be read to exclude the use of scientific management methods from areas involving exercise of professional competence, but rather that time and motion techniques may be more productive in some aspects of the library operation than in others.

The fourth suggestion is to recognize the significance of small gains either in actual dollar savings or in staff convenience and elimination of fatigue. A continuing saving of \$100 per year may justify spending up to \$2,500 for research or new equipment, and \$100 may be as little as one week of one staff member's time in a year.

The fifth and final suggestion is to recognize that perfection is rarely if ever reached. Operations should be kept under continuous scrutiny, assuming always that further improvements can and will be discovered with study and experience. There is, of course, the corollary

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—"Don't try to reach perfection in one step." In fact, it is frequently more practicable to freeze certain aspects of an operation in order to focus attention sharply on a related aspect, just as the scientist often starts with certain assumptions, but in due course, if not in the immediate process, retests and corrects these assumptions.

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## Standardization as a Tool of Scientific Management

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IN THE LIBRARY world the word standardization is not always considered with sympathy. Even in a standardization-minded country like the United States the tendency to uniformity and to elimination of individual variety is not liked by those whose task is to promote intellectual initiative and development and to encourage personal study and investigation. Yet one of the basic principles of scientific management is the application of standardization, and it is worth while to inquire in which cases standardization is justified and whether it can ever hamper progress.

Years ago the writer assisted as a meeting in the International Institute of Intellectual Cooperation (the predecessor of Unesco) on standardizing formats of books and papers. In the course of a spirited discussion an elderly librarian pleaded that it would be a shame if an almanac he displayed (perhaps it was the *Almanach de Gotha*) should be published henceforward in an industrial standard size. At this point Marie Curie spoke up to explain the value and the limits of standardization, with arguments than won at least one hearer to the idea of standardization.

The old definition of standardization is to eliminate useless and disadvantageous diversity and variety. The more positive one is to bring production to a higher level, to guide and plan judiciously the necessary diversity in order to promote harmony in variety, and to assure that human labor will be used in a worthy way. By eliminating waste of energy and by expelling gradually the inferior varieties in production, standardization should make its contribution to progress.

An industrial standard can be described<sup>1</sup> as a concise statement defining: (1) the form, size composition, quality, performance, or other

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characteristic of a material or a manufactured product; or (2) methods of testing, applying, or otherwise manipulating such a material or product; or (3) a relationship between characteristics of different products. Standardization in the field of librarianship and bibliography is not much different in principle, although the products and materials are intellectual, and not so easily definable in mathematical and quantitative ways.

The value in defining a term is arbitrary. In reality there are notions associated consciously or unconsciously with any phrase which are not covered by the formula of a definition. The word "standard" is connected with what is permanent and of high level. Since translation of terms in the international field into Latin or Germanic languages is based on the word "norm" (normalisation, Normung), there is an association with something that is normal and belongs to the average level of the mass. Such relations are dangerous, for it would be a wrong interpretation of standardization to connect it with permanence and with mediocrity. On the contrary, if it is to fulfill its purpose it should be dynamic and display a tendency to follow or, still better, to stimulate progress.

The major and direct aims of standardization are:

1. Interchangeability. In the material field there may be interchangeability in elements of building, or apparatus, or tools—e.g., in a library the interchangeability of bookshelves or their supports, or of catalog cards, or of bibliographic cards. This may concern objects of about the same size but of different qualities, such as catalog cards having dimensions of 75 x 125 mm. but of unlike color or material. It also may be directed to quick replacement of some part of an apparatus in the event of a breakdown; for instance, it may involve the fitting, voltage, wattage, intensity, or size of an incandescent lamp serving as the light source for a microcopying outfit. The direct economic consequence of free interchangeability of materials, entailing lower inventory because fewer sizes are required, is to decrease reserve stocks. Also, quantity buying of fewer sizes may follow, with lower prices.

Important as the above may be, interchangeability in the immaterial field is even more so. The economic gains possible from it are not so easily calculated, but they are not less real. The waste of time caused by widely different systems of subject headings, of methods of alphabetical arrangement (especially in non-English languages), and of classification and coding, result in the practical inaccessibility of vast amounts of information, which is lost so far as the general public is

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concerned. Not seldom a librarian develops his own system of cataloging or of classification; and while such initiative may be appreciated, readers are handicapped when they have to make searches and to trace information in a way to which they are not accustomed. Since it is so difficult for users to adjust to varying conditions, efficient use of bibliographic data, abstracts, and other information can be achieved only if the material arriving from several sources can be filed together more or less automatically.

2. Facilitated inspection and control. Insofar as some departments of a library or of an information service may be considered as small industrial workshops, standardization is an important means for inspecting the output so that gradually the best methods and processes may be chosen. Unless units of performance or elements of processes are standardized to some extent, it is impossible to make comparisons within one's own institution or with others. Again, if in a photocopying department nonstandard methods of producing copies and nonstandardized materials are employed, it is not feasible to make reliable precalculations and to fix rates in such a way as to serve the public well and at the same time avoid dangerous losses for the institution.

Insufficient study and attention to work standards, either in the case of material production or of intellectual labor, have only too often caused miscalculation, with subsequent losses, arrears, and other shortcomings in the performance of scientific institutions. Neglect of standardization means a deficiency in scientific management which not only brings harm to business enterprises but also to noncommercial agencies.

3. Facilitated training. Every employee entering a new job loses time in learning the routines. It is obvious that one changing his position will be trained in his new work more quickly if he has not to learn new techniques. In librarianship the turnover of the personnel is high, hence there is repeated loss of production in the periods of introduction. By standardization of methods and processes such loss can be reduced considerably. Also, training in colleges will be more efficient when acquired techniques can be applied without substantial modifications after the entry into practical service.

If results such as those suggested above can be obtained in a substantial degree they almost automatically tend to further improvement and make standardization fulfill its real purpose—the raising of quality and production. Yet it must be remembered that standardization is not

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an end in itself. If it amounts to a fad and renders no real service, it may kill initiative, freeze an existing situation, and retard progress.

Standardization can be achieved at various levels, i.e., (1) within one's own enterprise, (2) nationally, and (3) internationally. Of course the last—if it is realized—is the most effective, but it is the most difficult to attain.

Experience shows that standardization starting from the top and proceeding downward is seldom successful. Inasmuch as it should be based on actual practice, it should begin in the individual enterprise or institution, extend gradually to the national level, and finally to the international field. It should take into account the widest diversity of interests and should be the result of collective study and consideration.

Where standardization is a tool for economic management, the producers, the distributors, and the consumers should be considered as interested parties. This principle applies also in the noncommercial, intellectual field. In the world of documentation the producers are the authors, the editors, and the printers; the distribution is commercially in the hands of publishers and booksellers but noncommercially in those of librarians; and the final consumer is the reader, the student, or the intellectual worker. These three groups must be considered and consulted if a valuable standard is to be established, even when an individual institution is preparing a standard for its own use.

If a national standard is to be developed, the national standardization institution, such as the American Standards Association (ASA) in the United States, may provide for representation of all interested parties on the committee in charge. Finally, the representatives of the national standardization bodies may work together in a technical committee of the International Standards Organization (ISO) in order to arrive at an international recommendation and if possible an international standard. In the ISO the secretariats of the international technical committees are entrusted to various national standardization bodies. For documentation in the strict sense of the word (including librarianship) the secretariat is, for the time being, in the hands of the Netherlands Standards Organization (Hoofdcommissie voor de Normalisatie in Nederland). The secretariat is designated as "ISO Technical Committee 46—Documentation."

There are, however, other ISO technical committees of interest to librarians, viz.: ISO/TC 37—Terminology (assigned to the Oesterreichischer Normenausschuss in Austria) and ISO/TC 6—Paper (as-

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signed to the Afnor in France). A special subcommittee of ISO/TC 46 deals with document reproduction. The French standardization body, Afnor, is in charge of the subcommittee.

Meanwhile standardization is not a monopoly of national and international agencies. Older standards have been established more or less through tradition and have been accepted to a large extent, an example being those for printing types in the graphic industry. Gradually the preparation of standards has developed a technique, and it now is considered desirable to leave the organization of this work to competent bodies.

Although in principle the standardization agencies in the various nations work along similar lines, the procedure varies from country to country. In the United States the setting up of a norm ordinarily is undertaken if one or more competent and authoritative specialized bodies take responsibility for the preparatory work. In the field of librarianship the American Library Association acts as sponsor for the drafting of standards.

In some countries standardization is considered a government affair and standards assume the character of government orders. There is danger in such compulsory standards, however, in that they do not meet the requirements of practical life and that their character is insufficiently dynamic to enable them to follow the evolving of the equipment, methods, and processes for which they are meant. Moreover, there may be special circumstances in which it is desirable, if not necessary, to deviate; and official compulsion prevents the standard from serving executive needs at such a point, and hence may become a handicap. To forestall such a result, a standard specification should have the character of a recommendation.

Standards in librarianship and in the broader field of documentation concern the following general subjects:

A. Material of documents

1. Sizes of paper and like objects (such as forms, drawings, books, pamphlets, periodicals, bibliographic cards and slips, photographic material)
2. Quality and tests of material for documents (applying to paper, ink, binding materials, and photographic material, etc.)

B. Layout of documents

1. Forms for writing paper
2. Accountancy forms

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- 3. Drawings
  - 4. Books and pamphlets
  - 5. Periodicals
  - 6. Bibliographic cards and slips
  - 7. Various forms (e.g., library lending forms, etc.)
- C. Elements of the contents of documents
- 1. Graphic characters (handwriting characters for drawing, printing, and typing)
  - 2. Transliteration and transcription
  - 3. Symbols and abbreviations (for pure and applied sciences, for technical drawing, for titles of periodicals, etc.)
  - 4. Terminology
- D. Editing the contents of documents
- 1. Title references and bibliographical notices
  - 2. Abstracts, summaries, book reviews, and the like
  - 3. Periodical articles
- E. Arrangement of documents
- 1. Alphabetic arrangement
  - 2. Systematic arrangement
- F. Filing and storage of documents
- 1. Filing material
  - 2. Filing cabinets, indexing and other equipment
- G. Various apparatus (mechanical devices)

With some exceptions standards are available for the above, having been established by existing national bodies, or by other institutions, or by tradition. The International Standards Organization is only beginning its task. Some international recommendations have been formulated provisionally, however, and before the war the International Standards Association (ISA) published a few proposals (in the form of "bulletins") in this field.

Below are given a few examples of standards, especially in the domain of librarianship *strictu sensu*:

#### A. *Material of Documents*

1. *Sizes of paper and like objects.* Here standardization through tradition plays an important role. In old books the official folio sizes often show the proportion of the golden section  $\frac{1}{2}(\sqrt{5} - 1)$ , or approximately  $\frac{5}{8}$ . The international library card of 75 x 125 mm. (3 x 5 inches) retains the measurements of the first international post card,

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from which they were taken. A French law of November 4, 1798, prescribed metric sizes for paper derived from a basic rectangular surface of a square meter of which the sides show a proportion  $1 : \sqrt{2}$ , the only proportion which after repeated dividing into halves remains constant for the parts obtained.

At the suggestion of Wilhelm Ostwald, German standardization followed this principle (DIN 476; ISA Bulletin 7—1934).<sup>\*</sup> The Deutsche industrie normal (DIN) standard starts with the surface called A0, being 841 x 1189 mm.; A1, the half size, is 594 x 841 mm., and so on. The sizes A4 (210 x 297 mm.) and A5 (148 x 210 mm.) are those recommended for usual books and periodicals. Derived from this so-called A series are the B and C series, showing similar proportions and a metric base (B1 = 1000 x 1414 mm.). Some sixteen continental European countries have adopted the so-called A series. The French paper standardization (Afnor Q1, Q1-1/Q1-4) is based on three sizes: Carré (45 x 56 cm.), Raisin (50 x 64 cm.), Jésus (56 x 72 cm.). The Carré is the preferred one and includes the size (21 x 27 cm.) nearest to the A4.

The French sizes follow one another in a Renard series (ISA Bulletin 11—1935) of preferred numbers, in which the ratio is  $\sqrt[10]{10}$  and lower powers. The measurements in the Anglo-Saxon countries are nonmetric. A much-used American size for letter paper is  $8\frac{1}{2} \times 11$  inches. Near to it comes the English 8 x 11 inches, which is one of the preferred dimensions according to the series of British Standard Sizes for Paper (BSI 730—1937). The foolscap size which was and is much used in English official documents measures 14 x 17 inches—half size, 14 x  $8\frac{1}{2}$  inches, being about the proportion of the golden section. The tolerances for reduction, e.g., after binding, are important. In most countries they are 6 to 10 mm. for writing paper (DIN 198).

The standardized measurements of cards and slips have found the largest application all over the world. The 75 x 125-mm. card is used in almost every country, the size 3 x 5 inches, approaching it very nearly. The DIN A7 size, 74 x 105 mm., gives practically the same height of card, so that if necessary the DIN A7 cards may be mixed with the 75 x 125-mm. cards.

Sizes of letter covers (DIN 680, 678), file covers (DIN 821), and note pads (DIN 4999) are standardized in most countries in connection with the dimensions of letter paper. For post cards the Inter-

\* Full titles of standardization agencies are listed at the end of this article.

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national Postal Union has adopted the A6 (105 x 148 mm.) as the maximum (DIN 679). Sizes for accountancy forms often are set more or less by the machines used for office accounting and tabulating. In Europe there has been effort to make them conform to letter-paper sizes (N 1026). Drawing sizes have been standardized in most countries.

The sizes for books, pamphlets, and periodicals should follow the letter-paper standardization, and, in fact, most countries offer recommendations in this direction. However, the fact remains that there is a wide variety on the market. Most scientific books show formats of which the width varies between 12 and 18 cm. and the height between 19 and 25 cm., proving the weakness of theoretically developed standards. The consumer requires comfortable reading, and the publishers adopt what they think will best suit the buyers.

Sizes for various items have been standardized, e.g., for posters (DIN 683), name plates (DIN 825), folders for tourists (DIN 5000), and menus (DIN 5002). More important to the librarian, however, are the dimensions of photographic material, and here arises a typical difficulty. In the beginning, when document reproduction was not yet a regular library practice, the photographic industry fixed its own standards. Glass plates of 9 x 12 cm. and 13 x 18 cm. were usual. Then came the reduced camera film of 6 x 9 cm. and 6 x 6 cm., and the cinematographic film with widths of 35 mm., 16 mm., and 8 mm.

The librarians were only small consumers, and they were more or less compelled to accept the commercial sizes in photography. Today document reproduction has grown to such an extent that there is warrant for it to make its own conditions. Contact copying should follow the measurements of existing documents, and the present draft recommendations of ISO Technical Committee 46 Subcommittee Document Reproduction mentions the sizes A4 (210 x 297 mm.) and A5 (210 x 148 mm.) (cf., DIN 4520; NBS R 165-36). It is doubtful whether the suggested standard will be satisfactory. The majority of documents to be copied are a stage larger than A5 and substantially smaller than A4, so that keeping to the proposed standard would cause a considerable loss of sensitive material. A new international size, therefore, seems desirable. One of approximately 26 x 17 cm. would cover a considerable number of cases.

For copies made with the aid of projection (camera copies either macroscopic or microscopic), the proportion of the sides of the copying frame should correspond approximately with the average propor-

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tions of the sides of the documents. The usual microfilm frames ( $18 \times 24$  mm. and  $24 \times 36$  mm.) deviate about 6 per cent from the DIN proportion  $1 : \sqrt{2}$ ; but the average proportion in books is narrower, so that there is a loss of material in the width of the frames. H. H. Fussler suggested standardization of only one dimension of the frames (perpendicular to the direction of the microfilm), and adjustment of the other dimensions from case to case, so that the available surface of the frames can be fully used. Today the most usual widths of the rolls for full-sized or slightly reduced-sized photocopies are 21, 25, 30, and 33 cm. It would be desirable to standardize the width for ordinary photocopies to 21 and 30 cm. For the time being it seems desirable to keep the width of cinematographic films for document microreproduction, using the distance between the perforations (cf., ASA Z38.7.8/9/12—1944; BS 677—1942, 865—1939, 1153—1944, 1166—1944; DIN 4520). Microcards and microsheets at present follow the standard sizes for bibliographic cards, which mainly are  $75 \times 125$  mm. and  $74 \times 105$  mm., but also  $9 \times 12$  cm.

2. *Quality and tests of material for documents.* Practically all materials for documentary purposes have been standardized. It is curious that the preferences among those to be standardized are largely different from country to country.

Most standards for paper concern strength, moisture content, degree of opacity, lignin content, and sizing. The general tendency is to consider paper made from rags as of first quality. However, pure cellulose paper in many cases shows equal durability. Following are some examples of standards which have been established in various countries: Argentina, IRAM 3008-P; Germany, DIN 827; the Netherlands, N 176-1783; New Zealand, NZSS 362 (schoolpaper, stationery); Poland, PN P-02001; Rumania, Stas 570, 1568 (drawing paper); Russia, GOST 4665-49 (lightproof paper).

Ferric tannate inks (in Germany, Normaltinte), for which diverse countries have standard recipes, are considered permanent. The Bureau of Standards gives various formulas (NBS C 196, 301, 400). Inks containing carbon black (Chinese ink) are equally durable. Most inks containing aniline dyes are not lightproof. Colors of printing inks are standardized in some countries (N 903). Also, for carbon ribbon and paper the materials containing carbon black are most durable. In Germany the Reichsausschus für Lieferbedingungen gives valuable formulas (DIN RAL 976 A).

Standards set for the quality of binding materials, such as linen,

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leather, cardboard, thread, and glue, are of special importance to librarians (NBS CS 39-34, CS 57-36; BS 1544—1949). The standard pencil is the graphite copying pencil (GOST 444.7-48; DIN RAL 931/2).

For ordinary photographic purposes the sensitivity and grading of sensitized papers and films have been standardized (DIN 4566). Gradually also the special requirements for documentary reproduction justify standardization (ASA Z38.7.8—1947). Norms for durability, fineness of grain, and fireproof and moistproof properties of microcopies and photocopies are needed especially. The American Standards Association has now set up a special committee dealing with document reproduction, although this committee probably will give first attention to equipment for such reproduction.

#### *B. Layout of Documents*

1. *Layout of forms for writing paper.* Here an undesirable variety in standards has grown up, and is an aggravation. In the United States and Germany the address commonly is put on the left-hand side of a letter, with the same margin as that of the text. In France, on the contrary, the address is put at the right-hand side. In the United Kingdom there is no uniformity. (DIN 676-679; N 1026; NS 395-396; UNE 4002; UNI 925-931)

2. *Layout of accountancy forms.* These go their own way. They are strongly influenced by the construction of accounting devices, and a traditional standardization of checks and the like is affected by modern American office machines (DIN 684, 5003; SIS 732821; Afnor Q1-4, Q1-5; NBS R 37-38).

3. *Layout of drawings.* Standards in this field are to be found in almost every country possessing a standardization institution. Not only drawings for ordinary engineering work, but for special fields of engineering such as architecture, building, central heating, garden architecture, and naval engineering have been standardized (ASA Z14.1; BSI 308; CNM 41-43, 1303-1305; DIN 28, 34, 823, 824, 1919, 30084; GOST 4444-48; N 13, 36-41, 44, 45, 135, 453; PN B131-133, N94001x/94004; SIS 732, 821; SMS 672; Stas. 612, 687/8, 700, 734/6, 788, 869, 1-49, 2-49, 74-49; UNE 1032/1036; UNI 938-940).

4. *Layout of books and pamphlets.* At this point tradition is still the most important factor, and official standards are rare. Title page, colophon or impression, table of contents and indexes, and the place of indexes and tables of contents in books still vary widely. Even the data necessary for preparing a catalog card not infrequently are in-

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complete and inadequate. International standardization for technical and scientific books and pamphlets might be useful. Some improvement may be achieved by the so-called "publishers card," which should contain the necessary bibliographical data concerning a published book. Before the war the International Standards Association developed a standard (ISA Bulletin 22) which was accepted in various countries (DIN 1504; NBN 261; UNE 1001).

5. *Layout of periodicals.* Here international standardization has advanced although an ISO recommendation has not yet been established definitely. The first standard for the layout of periodicals was worked out in the United States under the title "American Recommended Practice for Reference Data for Periodicals" (ASA Z291—1935; cf., BSI 1629—1950; DIN 1503, 826; NBN 245; NS 22-23; UNE 1066). Before the war an international ISA recommendation dealt with the contents strips sometimes used to provide short summaries of the contents of periodicals. These could be cut into slips and pasted on cards, and thus offer abstracts of the articles in convenient form (ISA Bulletin 22; DIN 1504; NBN 261; UNE 1001). By many continental European periodicals the title is given at the bottom of the cover page of each number, with abbreviated title, volume, year, number, pages, date, and place of issue (ISA Bulletin 21; DIN 1501, DS 147-148; N 783).

6. *Layout of bibliographic cards and slips.* International standardization is badly needed for the exchange of bibliographic cards, and the prewar ISA recommendation (ISA Bulletin 22) was a step in the right direction (cf., DIN 1504; UNE 1056). However, while such a standard can be established in detail only when there is international agreement about bibliographic references, in practice many bibliographic services already make use of the 75 x 125-mm. card; and the prewar ISA recommendation for bibliographic titles combined with the Universal Decimal Classification number, the Library of Congress number, or the Dewey number as indicating the classification.

7. *Layout of various forms.* The Germans have standardized various forms for library administration, such as slips for lending (DIN 1500, 1506). Commercial forms have been standardized in the United Kingdom (BS 108—1951), application forms for employment in France (NF Z-45-004), and forms for registration of commodities in Germany (DIN 681). This list of examples might be extended.

C. *Elements of the Contents of Documents*

1. *Graphic characters.* In the expression of thought in graphic sym-

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bols the aesthetic value should not be underestimated, and therefore it is advisable to avoid overstandardization. Nevertheless, in order to promote legibility of texts for practical purposes, and also with a view to document reproduction, some uniform proposals are desirable.

For handwritten catalogs various recommendations have been established in library schools. The general one is to keep the letter form as simple as possible and to have the letters composed of parts of circles and straight lines. As height for the body, 2, 3, and 4 mm. have been recommended, with 5 mm. for capitals, most letters being developed from quadrangles of about 2 mm. square. Spacing between the separate letters varies from 1 to  $\frac{1}{4}$  mm., and between the lines from 5 to 10 mm. Drawn letters are standardized in numerous drawing standards (e.g., CNM 50 f1-f3; DIN 18-17; N 27-28).

Long before standardization institutions existed printing types showed a certain amount of uniformity. Systems of points were developed. The body is substantially the distance between the upper limit of a capital and the lower limit of the letter "j." The unit, the 7 metric point, was conceived by Fourrier and mathematically fixed by François Ambroise Didot, and later on perfected by Berthold. It is now 0.376065 mm. at 20° C., corresponding with about 1/72 inch. In the United States, twelve points (about 4.5 mm.) make a German Cicero, or one pica.

Average proportions between height and width of printed lines have been calculated. The Germans distinguish narrow script, middle script, and wide script. (The average proportions between width and length of the characters are respectively 0.5-0.53, 0.75-0.8, and 1-1.07.) The product, i.e., body  $\times$  number of types  $\times$  average proportion, then gives the length of a text. Thus, from a given line length, the number of lines of a text may be calculated. In fat types the width of the drawn lines is about one-fourth of the height of the type. Standards for the dimension of the composition and for correcting proofs are available in various countries (DIN NAGRA 11, DIN 1451, 2107; UNE 1034, 1-2).

Conventional typewriters show standard width of the spacing (pica 10 pitch, elite 12 pitch, microelite 16 pitch, etc.). The body corresponds approximately with 9-point and 7-point printing type. Modern machines with variable and adjustable spacing will cause the establishment of new standards sooner or later.

2. *Transliteration and transcription.* Here the library world is greatly interested in standardizing Cyrillic and other non-Latin scripts.

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The Library of Congress and the British Museum have developed their own standards for Russian script. In the international field a recommendation has been evolved by the ISO, based on the ISA proposal No. 7 of 1939. It is still difficult to get complete agreement on the point involved (cf., OST/VKS 8483). Also standards for transliteration of the Greek alphabet (DIN 1453) have been worked out.

3. *Symbols and abbreviations.* The standards for symbols in scientific and technical work still show confusion in the international field. Usually they are included in those for definitions and terminology. Although the main symbols for physical data are internationally accepted, the specialized sciences show many deviations from country to country. It would be desirable to have an international code. Chemists have international symbols for chemicals in the Table Annuelle des Poids atomiques of the Union Internationale de Chimie Pure et Appliquée.

The old Committee for Intellectual Cooperation of the League of Nations started a code of title abbreviations, based mainly on the principles applied by *Chemical Abstracts*. ISA Bulletin 23 improved this so that it became more or less an international standard. In various countries (Belgium, Germany, Holland, Switzerland) standard abbreviations of periodical titles have been issued. The ISO in 1953 accepted ISO recommendation No. 4 as general recommendation for them (cf., DIN 1502; N 782; NF Z-44-002; NS 386/387; SNV 90.100/90.101).

4. *Terminology.* Standardization in the field of terminology is spread over the technical committees of the national standardization organizations as well as of ISO. In a great number of specifications it appeared necessary to give definitions of the basic scientific and technical terms used. To bring some unification in the technique of terminology, ISO has established a special committee, ISO 37, which in principle has a coordinating activity only. In Unesco a special section is dealing with the problems of technical terminology and vocabularies, and collecting bibliographical and other data in the field of linguistics which is of interest from the point of view of documentation. In the special field of terminology concerning documentation itself the former International Institute of Intellectual Cooperation drafted a list of definitions.<sup>2</sup>

Before World War II the late Henri Lemaltré, with the help of many other librarians, started the compilation of an English-French-German vocabulary of librarianship. The International Institute of Intellectual Cooperation declared itself ready in principle to publish

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the work, but the war intervened. Subsequently Unesco accepted the responsibility for completion and publication of the vocabulary, and various experts gave their help to accomplish it. At the end of 1949 Anthony Thompson took over the task and brought it to a satisfactory end. The *Vocabularium bibliothecarii* was published in 1953.<sup>3</sup>

#### D. Editing the Contents of Documents

1. *Title references and bibliographical notices.* Although 90 per cent of all scientific libraries possess an international collection of books, in which at least three languages are well represented, we still are far from international standardization in this field. The librarians of the United States and the United Kingdom have come to agreement through the Anglo-American code, although it is not generally applied. The survey of J. C. M. Hanson, *A Comparative Study of Cataloguing Rules Based on the Anglo-American Code of 1908*, gives a splendid base for developing international rules, but little has been done since World War I.

ISO Technical Committee 46—Documentation has now come to the development of rules for title references, based on ISA project No. 3 of 1939 (cf., DIN 1505). Presumably in the near future an ISO recommendation for an international standard will result. At least it is to be hoped that rules for short-title references will be established. These will have great value in the mutual ordering of copies of periodical articles by reproduction services in the civilized countries, and for international lending and exchange of books. It is doubtful whether more detailed rules for cataloging will be accepted soon (cf., BSI CJ [OC] 4918; DIN 1505; N 917; SNV 90.103).

2. *Abstracts, summaries, book reviews, and the like.* There has been much discussion about this subject in Unesco and its Committee on Bibliography. For the time being the recommendations of *Chemical Abstracts* for preparing abstracts are widely applied.<sup>4</sup> ISO Technical Committee 46—Documentation is taking the subject in hand in consultation with Unesco.

3. *Periodical articles.* Before the last war the Office International de Chimie tried to establish a standard, specified as la Rédaction, la Présentation, et la Publication des Mémoires dans les Périodiques. There is need for general rules to be followed in preparing a scientific article in order to obviate useless repetition of known material, to avoid insufficient reference to previous publications, and to promote the use of a clear introduction, summary, and conclusion concerning

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the scientific results obtained.<sup>5</sup> The discussion of this subject in various committees of Unesco has not led yet to concrete results.

E. *Arrangement of Documents*

1. *Alphabetical arrangement.* Alphabetical rules, sometimes called ABC rules, are to be found in various American handbooks on cataloging and librarianship. Outside the U.S.A., codes for alphabetical arrangement have been established in France, Germany, and Holland (cf., DS 377).<sup>6-8</sup> Since words and names in all languages of the world have to be inserted in the alphabetical files of libraries and scientific institutions, it would be desirable to come gradually to international rules. So far no such ambitious project has been undertaken.

Of a more specific national character are the lists of subject headings. In this field the U.S.A. is ahead. The lists of subject headings prepared by the Library of Congress and other institutions are important tools for simplifying search, and show the advantages of standardization. The three-figure alphabetic order table of Cutter may also be considered as a simplification standard for alphabetic arrangement of authors' names.

2. *Systematic arrangement.* A certain number of widespread classifications have achieved the character of standards. The Library of Congress Classification and the Dewey Decimal Classification may be mentioned first, but the classification of Ranganathan and those of Bliss, Brown, and Cutter also possess value. In Europe the Universal Decimal Classification is the direct concern of the British Standards Institution and the Deutscher Normenausschuss for the English and German editions respectively, so that in the United Kingdom and Germany the U.D.C. is an official standard. The International Federation for Documentation is responsible for all international U.D.C. editions and the U.D.C. is the only classification kept up to date by international cooperation. The procedure for its establishment is about the same as for the engineering standards set by ISO and by national standardization bodies.

F. *Filing of Documents and Other Accessories*

1. *Files and covers.* Standardization here affects libraries especially insofar as vertical files are concerned. It should follow closely the standards for sizes of periodicals, pamphlets, commercial catalogs, and the like (cf., BS 1467—1948; DIN 821; N 690; SFS Z VIII 1/2).

2. *Furniture for filing.* Such furniture has been standardized in con-

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nection with the sizes of catalog cards, bibliographic cards, and filing covers (cf., DIN 4544, 4545; SNV 10.142). Also the shelving in libraries has become more or less uniform through tradition—the height of stacks about 2.25 m. and the width of shelves beginning at 20 cm. and increasing 5 cm. for each larger size.

#### *G. Various Apparatus*

The standardizing of equipment for document reproduction is felt to be necessary more and more. The American Standards Association has issued the following norms:

Z38.7.4—1944 R 1948	Projectors for Opaque Materials for Use in Small Auditoriums, Specifications for
Z38.7.5—1948	Printing and Projection Equipment, Methods of Testing
Z38.7.6—1950	Photographic Enlargers, Methods for Testing
Z38.7.8—1947	Microfilms, Practice for
Z38.7.9—1946	Microfilm Readers, Specifications for
Z38.7.10—1944 R 1948	Contact Printers, Specifications for
Z38.7.11—1944 R 1948	Printing Frames, Specifications for
Z38.7.16—1947	Resolving Powers of Lenses for 35-Millimeter Slidefilm and 2 x 2-Inch Slides, Method for Determining
Z38.7.17—1948	Reels for Processed Microfilm

The resolving power of lenses and other optical characteristics for cameras and enlargers has been made uniform in various countries (BS 161—1949; Afnor S 28-002; DIN 53383; PN M 54500; UNE 1030). Reels for microfilm were standardized in France under NF Z43-002.

In 1950 ISO appointed a subcommittee for document reproduction, forming part of ISO Technical Committee 46—Documentation. Draft recommendations were already available for the terminology of document reproduction, and for the sizes of photocopies and microcopies. Their intent is to standardize reading apparatus, although it is doubtful whether the time is ripe for that. Since the American production of microfilming equipment leads the way, it is to be hoped that the ASA committee for document reproduction will start formulating standards in close cooperation with ISO. It is hardly possible to realize international standardization as long as the country most representative in

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dealing with the subject does not partake intensively in the international work.

From the above random examples it appears that extensive standardization has been accomplished in librarianship and documentation, but that still much has to be done. International standardization is still in its infancy and needs energetic promotion. It cannot be stressed enough that, particularly for librarians and documentalists, standardization loses half its value if it is not done on a world-wide base. There is much good will in this respect, but international cooperation always moves slowly and much misunderstanding and ignorance is still to be surmounted.

The more the general idea of scientific management is understood and accepted in the library world, the more librarians will become standardization-minded. If we patiently try to stimulate that development, the work should be crowned by success. This may redound to the benefit of international understanding and cooperation, and thus do its share toward vanquishing the forces of destruction that threaten the peace and progress of mankind.

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KEY TO STANDARDS

- ASA—American Standards Association  
Afnor—Association française de normalisation  
BSI—British Standards Institution  
BS—British Standard (issued by BSI)

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- CNM—Comité de normalisation Mécanique  
DIN—Deutsche Industrie Norm (issued by Deutscher Normenausschuss)  
NACRA—Normenausschuss für das graphische Gewerbe  
RAL—Reichsausschuss für Lieferbedingungen  
DS—Dansk Standard  
COST—Cosudarstwennig Opshayusnig Standardov (USSR State Official Standard)  
IRAM—Instituto Argentino de Razionalizacion de Materialas  
ISA—International Standards Association  
ISO—International Organization for Standardization  
NBN—Norme Belge nationale (issued by Institut Belge de Normalisation)  
NBS—National Bureau of Standards  
    CS—Commercial Standard  
    C—Circular  
    R—Reissue  
N—Netherlands Standards (issued by Hoofdcommissie voor de Normalisatie in Nederland, HCNN)  
NF—Norme française (issued by Afnor)  
NS—Norsk Standard  
NZSS—New Zealand Standard Specification  
OST—Opshayusnig Standardov (USSR Official Standard)  
PN—Polskich Norm (issued by Polski comitet normalizacyjny)  
    B—Budonictwo  
    N—Nauka  
SFS—Finnish Standard (issued by Finland Standardiseringskommision)  
SIS—Sveriges Standardiseringskommision  
SMS—Sveriges maskinindustrie-forenings standardkommitté  
SNV—Schweizerische Normenvereinigung  
Stas—Standard de stat (issued by Rumania Comisium de standardizare)  
UNE—Una norma Espanola  
UNI—Unificazione Italiano  
VSM—Verein Schweizerischer Maschinindustrieller

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## Consequences of Management Surveys

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THE LIBRARY SURVEY has become so well established as an instrument of library management that there is almost no question as to its value and effectiveness. Librarians in difficulties over budgets or buildings, or staffs, or boards of trustees, turn to surveys by their colleagues as means of succor. Others embarking upon their work in new locations call upon groups of surveyors to outline programs of action. Boards of trustees or college administrations, aware that their libraries are not living up to potentialities but not knowing precisely what is wrong, call upon surveyors to point up failings and to tell what to do about them. Still others who desire support for contemplated changes or established programs turn to surveys for such help.

Yet the survey cannot be the final answer. The surveyors come and go and the libraries remain—sometimes a little shaken by the experience, sometimes stirred out of their lethargy, and sometimes undisturbed by the reports gathering dust in the archives. It would be an interesting and valuable experience to all concerned if each contract for a library survey called for the surveyors to return to the scene of their labors at the end of two, five, and ten years to see whether they would make the same recommendations again and to measure the progress of the library in the light of their findings and recommendations. If the surveyors examined the results of their work, evaluating the recommendations, the methods of applying them, and the development of the library at the intervals indicated, library literature would be much enriched and library management would be furthered to a much greater extent than by the surveys themselves.

The translation of managerial recommendations into library programs and operations is the subject of this article. It will attempt to examine some of the methods by which such translations are made effective, and some of the hazards encountered in the process. The

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article will not attempt to do more than suggest types of methods and hazards.

In planning the Enoch Pratt Free Library the architect and librarian contemplated an open arrangement of reader areas, separated by movable shelving, so that as departments merged or expanded the shelving could be shifted to meet the changed conditions. However, the builders failed to place finished flooring beneath the movable shelving, thus anchoring it in place and preventing fully effective consolidation of two departments for at least fifteen years.<sup>1</sup> At Charlotte, North Carolina, a library survey was made under the auspices of the American Library Association<sup>2</sup> and one of the more obvious conclusions was that the main library building was obsolete and should be replaced. Shortly thereafter a bond issue proposal was presented to the electorate and carried by a substantial majority of those voting, but in this case the law required support from a majority of registered voters. The bond issue failed and the survey recommendation was not carried out, because not enough registered voters cast their ballots.<sup>3</sup>

These cases are cited to show that many factors are involved in translating managerial recommendations into actual practice, and to demonstrate that a survey is a first step and not a final answer to management problems.

The managerial recommendations of library surveys generally fall into the following categories: objectives, government, finance, organization and administration, technical services, readers services, branch libraries and special collections, holdings, buildings, and library use. These categories, adapted from the table of contents of Louis R. Wilson's and Raynard C. Swank's *Report of a Survey of the Library of Stanford University*,<sup>4</sup> compare closely with the chapter headings in Errett McDiarmid's *The Library Survey*<sup>5</sup> and with tables of contents of other library surveys. Surveys of public libraries devote relatively more space to public opinion than do college and university library surveys, and the problem of branch libraries includes library extension. Otherwise the survey pattern seems to be fairly well standardized.

A facet which seems to have been neglected in the survey reports is scientific work study. The chapters on organization and administration are concerned with allocations of functions, elimination of duplication, and the establishment of lines of authority primarily on empirical bases. They seem little concerned with analysis of routines, mechanization, standardization, layout, work simplification, motivation, and time studies,<sup>6</sup> nor have they attempted to apply the scientific management

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method to determination of policies, programs, and organization. A few surveys, such as the one by Wilson and Swank cited above, make some recommendations concerning routines, but these again seem to be the result of general empirical observation rather than of careful analysis based upon close study.

That this is a weakness in the surveys will be denied by many. The profession has long decried the proneness of librarians to concentrate upon techniques, not realizing that scientific techniques can be applied to the larger areas of policy and objectives. In neglecting this phase of management the reports of library surveys have overlooked one of its more fruitful aspects.

An example of how a work study can result in a policy change is given by Margaret Ritchie Post in the *Library Journal* for July 1947.<sup>7</sup> A simple count of the number of loans requested by individual readers showed that so few wanted to borrow more than two or three volumes, that the policy of limiting the number that could be withdrawn was almost meaningless. Lifting the restriction saved a great deal of wasteful checking, and proved to be good from the standpoint of public relations.

One important reason that a scientific work study is necessary in a management survey is that a large proportion of the recommendations of such surveys call for the expenditure of money. The only way in which additional money can be made available from the budget for library operations without reducing services is through reduction in the costs of the routines. This is not to imply that enough can be saved out of operations to pay for more than a portion of new undertakings, but that saving can have an important psychological effect upon appropriating bodies and can result in an immediate increase in service.

Work study has a two-fold purpose: improvement of the product and increase in production. Out of these aims grow all of its activities. Those which improve the quality of library service and increase the amount of service rendered are true applications of scientific management, while, any which reduce productivity or dilute the quality of service are misapplications.

In this respect a work study is a device for focusing attention upon the total of library operations, in order to segregate those which neither improve the service nor increase its quality from those which do. It also seeks to determine which operations, devices, and arrangements of staff, space, and equipment, out of the totality of such elements

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available, will be most effective in improving service and in increasing production.

In applying the managerial recommendations of library surveys those which are concerned with library procedures and operations are usually easier to implement than those which deal with problems of library government, finance, and policy, because external factors have a relatively small influence upon them and thus a greater portion of such operations can be controlled by the library management. As an example, in the following two recommendations taken from the *Report of a Survey of the Library of Stanford University*,<sup>4</sup> it is obvious that one could be accomplished by simple internal decisions while the other would require complicated negotiations, involving cooperation by deans and other highly placed university officials more accustomed to accumulating authority and control than to relinquishing it.

The sample recommendations are "That all University funds for library purposes be budgeted to the Library, including special departmental gifts and the income of special endowments for library purposes, insofar as the declarations of gift permit, and including funds now spent from departmental equipment and expense budgets";<sup>5</sup> and "That order procedures in other large university libraries be studied with a view toward adopting simpler and more efficient procedures at Stanford; that certain order files and records be consolidated, thus making them easier to consult; that the accession register be abandoned; and that the work of the Order Division be coordinated more closely with that of the Bibliography Division."<sup>6</sup>

In applying both these recommendations, despite their differences, the first and most important step is to establish a favorable climate of opinion. This must be done by creating an understanding of the objectives of the managerial changes, by portraying the rewards which should result, and by encouraging objectivity and open-mindedness toward the changes.

Human nature being what it is, it would be unrealistic to assume that even the most convincing arguments can invariably bring about universal enthusiasm for recommendations. The attitudes are likely to range from opposition, through reluctance to passive acceptance, to friendly support and enthusiasm. Moreover, these attitudes may vary from time to time, depending upon the success of the application and continuing knowledge and understanding of the progress made.

For this reason, a timetable for measuring progress toward the objectives is a useful device as regards public relations, as well as a guide

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to the library management and staff in installing successive phases of a program. In constructing such a schedule the ultimate objectives should be kept constantly in mind, and each change should contribute not only to the achievement of those objectives but should be timed so that it builds upon previous developments and paves the way for further advances.

The schedule cannot, of course, be absolutely accurate. Unforeseen conditions may arise which will cause delays or which will dictate an early application of the recommendations. New technological developments or altered environmental conditions may force modifications of the plans, but if the objectives are clearly defined and the librarian is alert these can be taken in stride and fitted into the over-all program. The purpose should be steady progress toward achievement of the goals established by the survey.

Many of the recommendations of a survey are apt to be in general terms, outlining goals to be achieved and relationships to be established but not specifying particular machines to be used, forms to be adopted, records to be kept, or specific steps in procedures to be shifted, revised, or eliminated. The nature of such recommendations leaves so much to the discretion of the librarian and the staff that the achievement of the accepted aims depends upon them.

In translating such recommendations into action the library management should keep several basic principles in mind. All changes should improve the quality of library service and increase the rate of production. This applies not only to the internal routines of the library but also to major policy changes.

In most cases, improvement of the quality of service will depend upon two factors, the release of professional time for appropriate activities and improvement of the quality of professional personnel. The availability of professional time can be enhanced by applying the results of a scientific work study.<sup>10</sup> An analysis of library procedures will reveal those which duplicate operations and which safely can be combined so that the tasks are done only once. It can discover steps in routines, or even whole routines, which do not contribute materially to the quality or quantity of the final product. It can disclose routines the results of which are used so infrequently that occasional special studies would be more economical than applying the routine to the entire flow of material. The breakdown of a procedure into its simplest basic units will indicate those operations which can be performed most effectively and economically by machines or by clerical personnel, and which

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can be separated from those requiring professional judgment. This will cause the reallocation of some duties and the simplification of others. It may bring about the adoption of different forms and records and a general attitude of objective examination on the part of the staff.

In the application of these techniques the objectives of the recommendations and the purposes of the procedures should be carefully weighed against the results of each operation. Some processes will be found to be so directly responsible for achievement of the objectives that they must be retained. A few may be seen to duplicate similar operations, or, if they are essential, to be capable of being performed more economically or effectively as part of another routine. Others may be discovered to be either ineffective, uneconomical, or unrelated to the objective, so that if they can be eliminated the procedure will become simpler and more productive and economical.

In this process of applying the recommendations of a library survey many hazards exist which will, if not recognized and overcome, result in misapplication. Such misapplication can diminish the value of a survey and make achievement of its objectives improbable or impossible.

The hazards arise out of conditions which are inherent in human nature and in group organization. The existence of traditional concepts of organization and service, of ingrained habits of work, as well as difficulty in grasping the relationship between a whole program and each of its constituent parts, must be recognized. The ways in which these conditions cause misapplication of managerial recommendations can be cataloged in six categories, as follows: (1) improper analysis, (2) failure to integrate operations, (3) addition of new operations to old, (4) overuse, (5) underuse, and (6) abuse.

The improper analysis of a recommendation, a misunderstanding of its purpose and effects, and a faulty delineation of the operations designed to put the proposal into effect, will result in a situation which is often worse than the one the recommendation was designed to correct. Failure to integrate operations leads to duplication of effort and conflict of interest. It sometimes causes gaps in the structure of a program which can result in errors and poor service. Many of the misunderstandings which arise in a library staff, and between the staff and patrons, can be traced to such failure. Accompanying the integration of operations must be a clear definition of responsibility or the integration will fail for lack of this alone.

In many cases new procedures may be added to a library operation,

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but reasons may be advanced for retaining the old, and as a result the production rate is reduced rather than increased. This condition can arise through faulty analysis of a problem and through reluctance to change established habits.

The most common examples of overuse which result in misapplication of managerial recommendations arise out of enthusiasm for new machines. Machines are usually designed to do specific jobs accurately and speedily. Their value lies in the fact that they can perform a single repetitive task at less cost than it can be discharged by hand. They pay off within a certain range of operations, but as particular machines approach the borders of their range they become less effective, and finally other machines or methods can be found which are faster, more accurate, and more economical. A second type of overuse grows out of attempts to adapt procedures to situations for which they were not designed. The slavish copying of a large library's order routines by a small library, or the imposition of all the details of a central charging system in small branches, are examples.

A parallel situation can arise through failure to use recommendations, or procedures arising out of them, to their fullest extent. This often occurs through the persistence of established habits, or through lack of ingenuity in altering procedures to take advantage of machine operations. Often there is a fear of machines which is strong enough to prevent people from operating them efficiently, and which thus limits their use. This fear is usually overcome eventually, as in the case of the typewriter and the fountain pen, but it still remains in the case of newer devices.

A good management survey will present a set of integrated recommendations which form a program for action. Failure to use all of them may have more serious consequences than appear on the surface, so that careful consideration should be given before a recommendation is discarded.

A final hazard in applying the recommendations of surveys is the kind of opposition which amounts to abuse of the operations. In cases where this occurs it nearly always is because some of the preliminary work has been neglected, so that the proper climate of opinion has not been established. Whatever the cause, such a situation may occur anywhere. Sometimes the antagonism is not expressed and the person exerting it is almost unaware of its existence, yet it may show up in almost any of the six forms just discussed. It may appear in a series

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of mistakes or errors which tend to demonstrate that the recommendation will not work or that a new procedure overburdens the worker.

Such situations call for a careful review of the recommendation and all the steps in its application. If after such a review the management is convinced of the correctness of its position and of the presence of the abuse, the process must be started from the beginning, the proper attitude established, the objectives of the procedure defined, its importance discussed, and training in the operation reviewed.

In conclusion, the examination of a number of library surveys indicates that greater use of the techniques of scientific management would be profitable both in making the surveys and in applying the recommendations. This observation is pertinent to the study of policy, government, finance, and organization, as well as to internal operations. In fact a study based upon the principles of scientific analysis should bring operations and management into closer alignment. When a scientific work study has not been used in the preparation of a survey the library management should employ it in order to apply the recommendations effectively. Finally, the policy recommendations of a library survey would probably be more acceptable to laymen, and thus more easily and effectively applied, if they were based upon scientific analysis and scrutiny of work than upon empirical judgments and comparative studies alone.

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## The Management Engineer

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THE PROFESSIONAL practitioner of scientific management is the management engineer. Because the profession is new, no standard nomenclature has become established. Practitioners have been variously called management counselors, management consultants, management analysts, business counselors, business consultants, industrial consultants, and industrial engineers, although those bearing the last-named title are more closely associated today with plant layout and production activities than with the field generally.<sup>1</sup> Management counseling was little known until the late thirties. With the development of the social sciences and the *expertise* arising from the application of the scientific method to business problems the profession has advanced rapidly. A growing volume of applied business research, a resulting body of literature, and a methodology and proven results have gained for it a vital and important place in the contemporary business and industrial world.<sup>2, 3</sup> G. R. Terry has stated: "According to the dictionary, a profession is 'a calling in which one professes to have acquired specialized knowledge which is used either in instructing, guiding, or advising others.' It is obvious, therefore, that management is of a professional nature."<sup>4</sup>

The present article is concerned with the nature and scope of this profession, the circumstances which dictate the engagement of a management consultant, ways to insure success in counseling, and the benefits to be derived from the experience. Initially, the paper was intended to be a critical evaluation of surveys of various libraries by management engineers. This approach was abandoned after study and correspondence with consulting firms and librarians, for few reports on libraries by management engineers have been published, and few of those represent solely library studies. One respondent wrote: "In evaluating these studies . . . we trust you will consider the circumstances under which they were written. In none of the cases repre-

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sented by these reports were we engaged to study a library exclusively, but rather, all of the activities of the client government, and the time allocated by the client for the study of library operations was necessarily brief."<sup>5</sup> The attitude of the profession is that the statement growing out of a survey is a confidential report to a client, as shown by the following: "With the exception of the New York Public surveys which have been made available at the client's decision, it is our policy not to divulge the contents of the report except by request or permission of the client. Thus, I am unable to make available to you any of the reports."<sup>6</sup> Libraries, with one or two exceptions, have been unwilling to publicize the reports.

Further, no survey can be evaluated unless the reason for it is known. In several instances other than the New York Public Library surveys, where a library has been studied by a management engineer, the librarian of the institution had not employed the consultant and was unaware of the terms of employment, as he did not participate in the conferences which set the stage for the work. The framework of a survey being thus unknown, the conclusions and recommendations cannot be fairly or accurately evaluated except perhaps in comparison with national library standards. Since, however, the management engineer has not specialized in libraries and so few survey reports are available,<sup>7</sup> evaluation even in terms of standards could be only impressionistic and interpretive. Moreover, even recommendations on internal management problems by experienced librarian surveyors can be judged better by local authorities than by persons not familiar with the survey directives.<sup>8</sup> In another decade this situation should no longer exist, and the literature on the subject should be more complete.

The management engineer is defined as a professional with varied experience, trained in one or more of the social sciences, particularly business administration, and having expert knowledge of one or more management specialties. A working knowledge of modern office and industrial machines of all kinds and makes, their availability and adaptations, is an essential part of his make-up. He may be employed in the administrative branch of an institutional, business, or governmental organization, or he may be in business solely for the pursuit of his profession, offering his services to various commercial and institutional undertakings and predicated his worth directly upon his ability to analyze in the scientific sense. In time he may specialize in one business field or enterprise. He counsels in the art of management, which is both the executing and the control of a given policy as contrasted

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with administration, or the formulation and determination of policy. He is sensitive to a code of ethics which his professional society, the Association of Consulting Management Engineers, has developed.<sup>9</sup> He labors within strict limitations and his purpose is "to develop a solution to a well-defined management problem."<sup>10</sup> The solution must be workable, salable, and timely.

These limiting considerations "emphasize the fact that the management analyst must search out, not the ideal solution but rather the solution most suitable for a particular client at a particular time. Thus, the first basic skill required of the management analyst is the ability to *judge* which of the alternative solutions he can devise as most *workable, salable, and timely* in a given situation."<sup>10, 11</sup> He offers in addition the staff, equipment, and know-how of systems installation to activate his recommendations after approval by the consultee. In effect, the management engineer's specialization is a division of labor resulting from the growth of business units and "from fundamental changes in the economic and political environment of business."<sup>12</sup>

The survey concepts associated with sociological study and the organizational theories of political science are basic to the postwar management engineer's approach to the solution of institutional problems, but divorced from it. Political science long has advanced theory for the structure of government at the city, county, state, and federal levels, but has not isolated libraries, nor educational institutions such as universities, from over-all concepts and similarly hypothesized organizational theory. Early survey recommendations by management firms on state library agencies, for example, point toward better and more efficient organization, but do not take into consideration the nature and purposes of the units to be consolidated.<sup>13-15</sup> Later studies<sup>16, 17</sup> show the tendency to assume governmental organizational structure and administrative policy statements, and to concentrate on internal management to achieve goals of efficiency and economy. In these terms a brief comparison with the library survey as conducted by librarians is helpful.

The library survey developed out of the community-survey concepts of the sociologist, and became popular because of the rapid growth of libraries in the beginning of the twentieth century and the resultant problems, including those due to increased costs, and the fact that librarians were being asked to justify their libraries in relation to changes in educational, social and cultural patterns.<sup>18</sup> The survey method employed most frequently by librarians has been

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that of comparison. Standardization is a cardinal principle of bibliography, upon which rests the structure of the book collections and services of libraries. Standards promulgated both in national and international book and documentary activities, therefore, serve as the primary norm. Comparison "has taken various forms: (1) the present condition of the library is compared with its condition in preceding years; (2) the library is compared with other aspects of the university; (3) it is compared with libraries of similar institutions; and (4) it is compared with external standards, some of which have been devised by methods which may be questioned."<sup>19</sup>

According to G. R. Lyle, who writes in relation to college libraries, "The immediate purpose of evaluation is to provide a careful, critical analysis of the condition of a library in a particular college. Such an evaluation accomplishes three things: (1) it provides the necessary information for formulating a program of future development of library resources and services coordinated with the aims of instruction; (2) it serves to stimulate faculty participation in the development and use of the library; and (3) it furnishes the data for interpreting library services and thereby provides a basis for increased library support."<sup>20</sup> And a publication of the American Library Association states: "A survey of a library by one or more experienced library surveyors is an accepted method of checking up on the extent and quality of service, of planning a program for the future, of setting up immediate or long-time objectives, and informing and interesting the community in the library."<sup>21</sup> It seems clear that the emphasis in the librarian's survey has been on administration and not management—on evaluation in comparatives leading to long-range policy, programming, and planning.

Since librarians have not had much experience with the management counseling profession it is necessary to examine the question, why use professional consultants? But as the universality of management suggests, the situations in business experience shown as the causes for the engagement of outside consultants are directly comparable to library management activity.<sup>22-24</sup>

Management pervades nearly every human activity. There is, for example, management in the fields of industry, government, education, religion, agriculture, and charity. Few escape the influence of management, since either they are managers or they are being managed. Usually the concept of management is thought of as applying to a group, but the term also applies to an individual. Everyone performs-

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ing a task alone or for himself utilizes at least a modicum of discretion and responsibility, and a voluntary urge toward achieving the desired end. Management is essential to most meaningful efforts and achievements.

Erroneously, and all too frequently, management is viewed as an activity existing only in a factory. This belief is due to the fact that the study and application of management . . . started in the factory and applied to the efforts of producing or manufacturing various goods. However, the fundamentals and techniques of management are applicable to all types of activities, including that of sales, merchandising, finance, transportation, real estate, government, school, farm, armed forces, and the operation of a household.<sup>25</sup>

Six situations have been identified as typical causes for the employment of a management engineer, and a decision to use a consultant is apt to be based upon a combination of these rather than upon any one. The six are: (1) "Management does not have the time and/or the staff to do the job." (2) "Management has tried to solve the problem and failed." (3) "Management requires outside assistance for political or organizational reasons." (4) "Management wants a 'fresh look' by an outsider." (5) "Management is confronted by a problem with which it is not familiar." (6) "Management wants information not normally available in the business. . . ."<sup>26</sup>

Translated into terms of library management it may be assumed that a combination of situations numbers 1, 2, 4, and 6 led the New York Public Library a few years back to engage the consulting firm of Cresap, McCormick, and Paget to study the acquisition functions of its Reference and Circulation departments<sup>27</sup> and the preparation functions of its Reference Department.<sup>28</sup> The letter of agreement on the study of preparations procedures, dated January 3, 1951, states the objective of the study as below:

. . . *Three principal objectives were specified:*

First, more expeditious handling—so that new acquisitions will reach the shelves, and cards will reach the official and public catalogs in a minimum of elapsed time.

Second, lower processing costs—to be achieved by a maximum rate of sustained output by all members of the staff who participate in preparation activities.

Third, the highest practicable level of accuracy and consistency to assure correct cataloging, and minimize misfiling of cards, misplacement of books, and similar errors.

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These objectives stressed adequacy of service to users of the collections as well as economy in the performance of the preparation tasks.<sup>29</sup>

The same firm's letter of proposal, dated March 3, 1950, describes the specifications for the procurement functions as follows:

1. *The purpose of the study* is to "make recommendations that will contribute to more efficient operation, both with respect to the commercial phases of purchasing and to internal operating costs." To this end a careful study has been made of organization, procedures, and personnel.

2. *The content of the procurement function* is defined as embracing "the work relating to requisitioning, purchasing, receipt and distribution of materials and to accounts payable." The term procurement likewise includes the "receipt of material as a result of gift, purchase or exchange . . . and the disposal of gifts not required in the Library's collection."<sup>30, 31</sup>

A well-defined management problem as a part of the contract with the consulting firm is essential. The objectives and scope of the proposal should be clearly and succinctly outlined, and its limitations set forth, in pre-planning conference with the management engineer, and the method of study should be described. An estimate of cost should be included in the agreement, as well as a statement of possible benefits.

Success in counseling is vitally dependent upon complete cooperation and the availability of all pertinent information to the consulting firm. All responsible officers of the business or institution should be fully informed as to the purpose and scope of the study and should participate in pre-planning. Thorough discussion of the problem by all interested parties, and substantial agreement that a problem exists and a consultant should be called in, constitutes pre-planning.<sup>32</sup> Cooperation is thus assured, and the time required of the consultant is reduced. The lack of usefulness in certain investigations in libraries made by management engineers, aside from that due to the confidential nature of the inquiries as noted before, has been the failure of the contracting officials to observe these prerequisites. Contrariwise the success of the study of the preparations functions of the New York Public Library, as Robert E. Kingery states, "represent[s] an unusual degree of collaboration between the survey staff of Cresap, McCormick and Paget and the members of the Reference Department most directly concerned with preparation functions, and are, in large measure,

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the product of joint analysis and discussion. Therefore, it is not surprising that seventy of the recommendations have, with minor adjustments, been either fully implemented or are in process of being carried out."<sup>23</sup>

Progress reports, oral or written, should be requested of the management engineer at regular intervals, and a firm date should be established for the study's completion. Before acceptance of the final written report, an over-all oral statement should be required to supplement and set the stage for the specific recommendations for improvement. The report should contain suggested procedures, forms, and flow charts, and observations on problems of implementation. Systems installation should be an integral part only if contracted for in the pre-planning stage. Surveys usually do not extend to this step.<sup>24</sup>

The management engineer should be responsible to an individual executive and in turn the executive should be held responsible for the consultant's activity. Staff should be furnished to the consultant if the need is foreseen in pre-planning conference. The following quotation testifies that success or failure of a management study by an outsider is finally dependent upon the attitude with which the administrator or administration agrees to consultation:

The key to the attitude of managements that have had successful consulting contacts seems to be in their *real acceptance* of certain troublesome conditions inherent in the use of consultants. If the executives understand that those conditions exist and are willing and able to accept them, an attitude results which is conducive to a successful consulting assignment.

We believe that management must accept the following three troublesome conditions before a successful consulting contact can develop: 1. The use of a consultant involves extra demands on executive time and management must be willing and able to give that extra time. . . . 2. Management must understand that a certain amount of time is required between the assignment of the problem and the fruition of results. Management must be willing and able to stand this time lapse. . . . 3. Management must be willing and able to create an atmosphere of cooperation.<sup>25</sup>

The selection of the right management engineer or consulting firm is also essential to a satisfactory job. A first decision should be on the type of consultant desired, based upon the nature of the problem to be offered to an outsider for solution. Whether to select a generalist or a specialist is debatable. Since there are librarians who seek consulting

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assignments, though ordinarily without training in modern management methods, the library may benefit more from the work of the generalist. The selection of such an authority is consonant with a need to seek assistance outside of the library profession for political or organizational reasons, and for a fresh look by an outsider. If the consulting firm has specialists on its staff, as many do, or if the concern is willing to call in librarians as advisers to assist in the study, then the generalist should be a sound choice.

The management engineering profession has developed criteria for the acceptance of consulting assignments. The firm should decide, after preliminary discussion of the problem, whether it is competent to undertake the work and whether it has a qualified senior analyst to put in charge of the job. A reliable concern often will decline proposals and recommend other management engineers more qualified for a particular investigation. The administrator should examine reports of completed studies by the companies he is considering, and should seek the opinions and experience of others about the firms. Further, he should secure estimates of the cost of the work and ascertain the firms' reputations both financially and professionally. Finally, he should interview personally the management analyst to be assigned to the job. His decision here should be made just as if he were considering the person for a permanent position in his organization.

Most important is the administrator's judgment of the ability of the proposed analyst to work with his staff and to elicit its respect and cooperation. D. P. Hess has said: "Before retaining any consultant, I would want to make very sure that in addition to adequate technical knowledge, he had a maturity and personal qualifications to be able to contribute to the further development of the executives in my organization with whom he would be working. After all, the consultant's primary function is to advise and assist. It is up to us in management to make the decisions and direct our organization in achieving our objectives."<sup>28</sup> These criteria cannot guarantee selection of the best consulting firm for a given problem, but they are useful safeguards in assisting the administrator to make an intelligent decision.

The engagement of consultants by libraries is commonly considered too costly. Many librarians believe they cannot afford or justify the expense or long-range budgetary planning which is necessary to obtain the required sum. For the average library this is probably true; although if the librarian lacks the time or staff or both to do the job and he and his staff have not been successful in solving the problem,

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a consultant may offer an economical means to solution. Joel Dean asserts: "Notwithstanding the fact that very large concerns often make extensive use of outside advice, there are grounds for believing that for such companies counsel should be restricted only to highly specialized studies. In general, the concerns that seem to benefit most from such services are the medium-sized and small companies."<sup>27</sup>

This conclusion can be justified for libraries further since (1) the typical library management problem is not likely to recur with regular and short-term frequency, (2) the library does not ordinarily employ personnel qualified to do the job, and (3) if staff is available it may be difficult to concentrate the time necessary to a prompt solution, since other matters of a professional nature may necessitate transfer of the staff to another assignment. Direct savings or, more important, improvements in internal management which will produce greater value for dollars expended, are sufficient to justify outlay for a study by a management engineer.

The cost of using a consultant is summarized by A. H. Dunn:

Three methods of payment are used: per diem, lump-sum and retainer.

The per diem fee, the most commonly used basis, ranges from \$50 to \$150 per day per man (occasionally higher) depending upon the experience and reputation of the individual and the firm of which he is a member. When per diem is used the total cost of the assignment depends upon the number of men used and the length of time spent on the job. A few of the consulting assignments studied were performed by a single member of the consulting firm, while the bulk of the cases involved two or more members. In most cases it is not possible to foretell the precise number of days required to complete an assignment.

The study found the lump-sum method of payment to be most typical for an exploratory study by the consultant to ascertain the nature and scope of the problem under consideration. These surveys were usually of short duration, sometimes only two or three days, and therefore the cost ran only to a few hundred dollars. However, some exploratory surveys were found whose cost was as high as \$10,000.

A consultant's retainer fee runs in the neighborhood of \$150 to \$250 per month (and occasionally higher) and is employed by those companies desiring a continuing relationship with their consultant. This method of payment is the same as that used by many companies to remunerate their legal counsel.<sup>28</sup>

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These fees are not inconsistent with those paid to librarian consultants.

Benefits to be derived from association in management analysis with the management engineer are both direct and indirect, actual and implied. The chief of the Preparations Division of the New York Public Library reports, referring to the study in that library:

It is, of course, too early to tell what the final results of the survey and its recommendations will be. However, it is already clear that the first two of the three principal objects [sic] of the survey will be achieved. During the fiscal year 1951-52, the division cataloged 90,736 titles as compared with 76,341 for the previous fiscal year. It is expected that we will handle 150,000 titles during the fiscal year just beginning, without any increase in staff. The elapsed time between the receipt of the material in the Division and the filing of all cards for that material in the catalogs has been substantially reduced so that one month is the average for the material received in bound form.

Important as these results are, the "human" ones are undoubtedly more important and more enduring. Because of the close team work among the survey staff and the division staff, we now feel our problems can be solved, and that the day is not far distant when, without arrearages, we can enter phase five, "long-range action."<sup>28</sup>

From the Acquisition Division of the New York Public Library, the chief wrote:

Of the 41 recommendations made in the Survey for the Acquisition Division, 19 were put into effect in full and 12 in part. Four others were tried and given up. The responsibility for one activity was shifted from the Division. Five are still under consideration. All in all, a total of 41.

The Survey has enabled us to increase production and has been a source of many new ideas. From its groundwork, a continuing process of self-examination has been going on and phases of our work have further changed in ways not contemplated by the Survey.<sup>29</sup>

The analytical ability and skill, the objectivity of the approach, the varied experience and the independence and impartiality of the management engineer, together with effective presentation, can lead to solution of problems in chain reaction and often in different directions.

Dealing with the presentation of results, Dean says:

Because of his experience in systematizing information and his practice in writing reports, the consultant usually develops a facility for presenting his findings and conclusions forcefully and clearly. This is

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a significant ability, for sometimes an orderly, logical, and clear presentation of information already in the possession of the management aids materially in solving a problem. On other occasions an integrated word-picture of a firm's entire operations provides the management with an over-all view difficult to obtain in the course of routine administration. Furthermore, a forceful presentation of the findings frequently leads the management to decide and act on matters over which it had long been procrastinating. Thus a clear presentation often sharpens the issues, aids in a balanced comprehension of the entire organization, and facilitates decision and action upon the consultant's recommendations.<sup>40</sup>

A good example of these benefits is the recently completed study of growth in research libraries in the northeast. The problem assigned to the consulting firm employed "to conduct a preliminary review of the problem and its recent history, as the basis for analyzing the complex issues involved and developing proposals for . . . consideration"<sup>41</sup> was stated in part as follows: "The increasing volume and variety of publication, the growth of research collections, and the constantly growing demand for reference material have made present library facilities inadequate. Library buildings cannot house the books that are needed, nor contain the readers who wish to consult them. Diminishing incomes make it increasingly difficult to acquire needed materials and to provide adequate staffs, and practically eliminate the possibility of building additional facilities for the various libraries involved."<sup>42</sup> "The problem is aptly described as one of 'vastness, complexity and growing intensity.'"<sup>43</sup>

The objectives of the review were four: "1. To examine briefly past efforts to meet this problem . . . 2. To retrace the discussions and deliberations of key officials of libraries in the northeast during recent years . . . 3. To identify the issues which led to the appointment of the Trustees' Committee . . . 4. To outline for the committee an approach through which action can be initiated on immediate and long-range problems . . ."<sup>43</sup>

The study, which was conducted in October 1952, concerned four major research libraries in the northeast—Harvard, Yale, Columbia, and New York Public Library—and led to a new statement of policy and accelerated administrative action in one. To develop and to implement the new policy a management research assistant<sup>44</sup> was added to the library staff. The recommendations of the consultants briefly were: "A two-phase approach should be applied to bring immediate

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relief and to lay the foundation for long-term relief. Phase I—Self-Solution: Comprising those steps which can be taken now by each Institution without resort to collective action. Phase II—Collective Solutions: Comprising those steps which require collective agreement and action to compress the space occupied by little-used [or limited-audience] research materials, and to reduce the *rate* of growth in individual libraries.”<sup>45</sup>

The administrative head of one institution remarked: “As librarians, of course we know about these problems and proposals. They have been widely discussed but the discussions have not been implemented by serious studies or action. We believe that Phase One is a program that each individual library organization can and should carry out for itself and that it would be less costly if undertaken in this way.”<sup>46</sup> As to Phase II, “I believe this is where we librarians need help. May I mention . . . that the ‘core’ of the problem is university-wide cooperation.”<sup>46</sup>

This comment was followed immediately by proposals affecting the immediate future of the library in question, addressed to the university administration. They included detailed plans and costs for the installation of new stacks in compact storage arrangement, an accelerated microtext program, and the establishment of a staff charged with the selective retirement of little-used materials from the stack collections through outright disposal, the substitution of microtext for volumes, and transfer to the library’s storage collections. It was estimated that through these steps the library’s growth problem would be solved for at least twenty years, and possibly longer. In summary, it was stated: “What is recommended above constitutes a recognition of a new policy for the libraries . . . : selective, instead of all-embracing; selective acquisition and selective retention or storage.”<sup>47, 48</sup>

Other collateral benefits from the work of the management engineer may be derived from (1) his ability to get at the major cause of a problem; (2) the extent of his research to test alternative hypotheses based on scientific methodology; (3) the stimulation of personnel in the organization studied to seek solutions to their own difficulties; (4) the development of standards or comparisons previously non-existent; and (5) the “installation of modern management techniques. . . . Frequently the manager is too occupied with routine administrative duties to read or visit extensively enough to keep abreast of new developments. Thus it is the function of the management engineer to know these new developments and to serve as a connecting link be-

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tween the generalized research of the universities and its application to scientific business problems."<sup>49</sup>

As the librarian faces the growing complexities of modern book and documentary problems, coupled with his professional aim of evaluating library services through the success enjoyed by library patrons in accomplishing their purposes, it would appear he can benefit from the scientific thinking and methods of the management engineer. Modern management concepts of executive development, psychological counseling, resistance to change, communication, planning and control, employee participation in management, systems or operations research, statistical controls, compensation, training, work measurement, and the trend to put the word "man" back into the word management<sup>50</sup>—all are at the command of the management engineer. While firms of management engineers have had little experience with libraries, and while intensive methods and procedures analysis, systems management, and the scientific methodology used in business, have not been easily applied in all library situations, the over-all objectives in business and library administration are similar. An acceptance of this likeness, a knowledge of the limitations of the management counseling profession, and a willingness to use the management engineer should be of considerable aid to the library administrator in planning the library of the future.<sup>51</sup>

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## Standards of Performance for Hospital Libraries

FOSTER MOHRHARDT

WORLD WAR I brought development of an intensive professional library program for hospitalized veterans. When the shattering influence of World War II was felt by the Veterans Administration, increased facilities and services were required overnight. General Omar Bradley became Administrator of Veterans Affairs and was charged with providing adequate facilities, staff, and services. The Veterans Administration itself was completely reorganized, and within the new pattern Francis R. St. John was selected to plan an expanded library program for its hospitals. There was immediate need to secure standards, not only for the present hospitals but for the sixty-four new ones it was planned to build and open in the years between 1946 and 1954. Objective data and criteria for setting up standards suited to budgeting and operating were necessary in order to establish requirements to govern funds and staff.

The most urgent demand was for guidance in determining the library staffs needed in the hospitals. It was essential that a study of workloads be set up which would be simple and direct and give immediate results. The purposes as evolved were: (1) assembling of data to assist in organization and workload assignments with secondary emphasis on improvement of management; (2) establishment of standards which would stress creative rather than routine library work; (3) permeation of patients and medical librarians with a concern for individual time allocations; (4) presentation to the librarians of the total job in field libraries.

The study was unique in that, even though it covered a large number of libraries, it dealt in essence with a single basic administrative pattern. The variables were limited to the size and type of hospitals.

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With allowances for these, activities and methods could be described in general terms and standard work assignments could be examined. Whereas most work studies are concerned with the time allotments and work relations of groups, this one involved many one-man or two-man staffs. Hence the interest was in the breakdown of work performed by one librarian, particularly with regard to the relative percentages of professional and subprofessional or clerical work.

Preliminary to the actual study was the determination of "basic assumptions" covering the scope and service of libraries in the Veterans Administration. As outlined for the study, these were as follows:

1. Library service would be an integral part of the total program of the Veterans Administration and would provide specialized assistance to:

- a. Medical and allied staffs, through separate medical libraries. This service would include reference, research, interlibrary loan, and bibliographic aid.

- b. Patients, through readers' advisory and bibliotherapy programs. In addition to the usual services of public libraries, special emphasis would be given to ancillary help in the care and treatment of patients. Emphasis would be placed upon serving the nonambulant patient, and deliveries to the bedside would be provided through the use of book carts. Service would be planned also to fit the specific needs of particular types of patients.

- c. Nonmedical staffs of the Veterans Administration. General reference facilities would be provided for other branches of the Veterans Administration, such as those of Insurance, Vocational Rehabilitation and Education, and Finance.

2. Wherever possible, repetitive clerical and routine procedures would be performed centrally in Washington. This would not only provide a more economical operation in terms of actual costs, but would also enable the field librarians to use their time most profitably in professional activities. Functions to be centralized would be:

- a. Technical processes. These would include book procurement, subject classification, and cataloging, including preparation of sets of catalog cards, charging cards, and book pockets.

- b. Book reviewing. Advance copies and galleys of books would be reviewed. A weekly list would be sent to the field as an additional specialized guide to selection.

3. Final responsibility for the choice of books would be delegated

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to field librarians. Centralized control of selection would be relinquished, except for general review of questionable or expensive publications.

With establishment of these objectives, it was necessary to specify the needs for staffs at the hospitals. In order to determine these, a questionnaire was developed to obtain detailed information from representative hospitals. Librarians were requested to furnish time data on a group of elements. The most important were:

1. Quantitative factors. (The annual working schedule per full-time employee was considered to be 1,696 hours. This balance remained after deductions of annual and sick leave and holidays.)
  - a. Hours per week patients' library to be open.
  - b. Hours per week medical library to be open.
  - c. Physical layout of hospital (allowances to be made only for unusual distances, buildings without elevators, and the like).
  - d. Percentage of bed patients.
2. Qualitative factors, i.e., the type and extent of service. (Teaching programs were planned for most V.A. hospitals. One group located near medical schools would conduct formal training programs with university residents. The other group would have provision for internal instruction.)
  - a. In teaching hospitals with residents.
  - b. In teaching hospitals without residents.
  - c. In nonteaching hospitals.
3. Estimated workload according to kind of hospital. The library program and the resultant workload vary both with the sort of hospital and the variety of patient. Tuberculous patients, who are confined to bed as an essential condition of their treatment, are intensive readers with highly diversified interests. The greatest demands for library service are made by them. Psychiatric patients receive both individual and group library service, and since special attention is given to group discussions by such patients the service to wards is less than that for the tuberculous group. General medical and surgical hospitals primarily serve short-term patients and have limited library programs for them. Factors considered in determining the ward time needed for effective service were:
  - a. In general medical and surgical hospitals:
    - (1) Amount of time per patient for ward trips with the book cart.

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- (2) Number of trips per week.
- b. In psychiatric hospitals:
  - (1) Amount of time per patient for ward trips.
  - (2) Number of trips per week.
  - (3) Amount of time per group-therapy program.
  - (4) Number of group-therapy programs.
- c. In tuberculosis hospitals:
  - (1) Amount of time per patient for ward trips.
  - (2) Number of trips per week.
- 4. Technical and administrative duties.
  - a. Selection of books.
    - (1) Reading of reviews.
    - (2) Meeting with Medical Library Advisory Committee.
  - b. Ordering of books.
  - c. Compiling of book lists for patients.
  - d. Professional reading.
  - e. Supervision and instruction of assistants, volunteers, and cadet nurses.
  - f. Talks to classes and other groups, and attendance at hospital staff meetings.
  - g. Weeding of collection and discarding of books.
  - h. Correspondence, including telephoning and interdepartment communication.
  - i. Cataloging.
  - j. Arranging of book displays.
  - k. Checking of supplies and requisitioning.
  - l. Regular and special reporting.
  - m. Publicity activities, i.e., radio broadcasts, photographs, newspaper items.
- 5. Clerical duties.
  - a. Accessioning of periodicals.
  - b. Keeping of circulation records.
  - c. Filing in card and vertical files.
  - d. Messenger work, i.e., travel between library building and offices, searching for lost books, calling people to telephone, and other errands.
  - e. Marking of books.
  - f. Opening of mail.
  - g. Pasting and mending.
  - h. Putting newspapers on racks.

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- i. Shellacking books or attaching binders.
- j. Shelving of books and reading of shelves.
- k. Typing.

The reported data on all of these items from the stations showed that the V.A. libraries formed a discrete class. The range of amounts for each of the items was small, indicating that the results could lead to establishing basic standards of staffing for all V.A. libraries.

Analyzing this accumulation of data, the findings were first grouped for use under the following headings:

1. Minimum librarian's time per patient necessary to provide adequate ward service.
2. Hours required for staffing patients' library.
3. Minimum time required for adequate medical library service.
4. Hours essential for technical and administrative duties.

In arriving at the number of hours needed for each of these factors, a separate formula was developed for each of the three types of hospitals. The formulas and figures derived from them are shown in detail below.

In decision as to the number of hours a library should be open, a major consideration was that the patients are hospitalized for twenty-four hours per day, seven days per week, and should not be limited to library service during a five-day, forty-hour week only. The following criteria were developed for use in determining the necessary hours for providing minimum service on the wards:

1. In tuberculosis hospitals, where the nature of the illness makes the demand for reading material the greatest, three visits per week to each ward are required. With ward calls at this frequency, the average time allowed for the librarian with each patient is three minutes. If trips are less frequent, the librarian's time per patient should be increased.
2. In general medical and surgical hospitals, two visits per week to each ward are required. Five minutes per patient are recommended.
3. In psychiatric hospitals, two calls per week with books in each closed ward are required. Since these visits are made to day rooms where there are groups of patients, it is possible to provide service to a maximum of forty patients per hour. In addition to the stops at the day rooms in the psychiatric hospitals, two visits per week must be made to the general medical and surgical wards.

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4. For each three hours spent on the wards, it is necessary for the librarian to spend at least one hour in preparation, i.e., in selecting books, resheling, filing cards, and similar duties.
5. Daily trips to reception wards are needed at all hospitals.

The hours the patients' library is to be open will be determined on the basis of the number of ambulant patients. No consideration will be given to the fact that employees use these libraries. The size of the medical staff has been the major factor in determining hours that the medical library must be open.

After studying the accumulated factual data, it was possible to set up formulas to be used in estimating general staff requirements. The evolving of such formulas was a preliminary step in the development of staff patterns. Those used for general budget estimates were as follows:

#### **Psychiatric hospitals.**

1. "Ward trip" indicates hours per week required for book-cart visits by the librarian to other than general medical and surgical patients, and equals number of "ward patients" times one and one-half minutes per patient, multiplied by two for two trips per week, plus one hour of preparation for each three hours in the ward.

2. "GM&S" indicates hours per week required for ward trips to general medical and surgical patients and equals the figure for those patients times five minutes per patient, multiplied by two for two trips per week, plus one hour of preparation for each three hours spent on the ward.

3. "T.A. duties" indicates hours per week required for the technical and administrative duties outlined in the attached explanation.

4. In hospitals of 2,500 patients and above, one full-time administrator is required and the "administrative duties" are removed from "T.A. duties."

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*Example:* 1,000-bed psychiatric hospital

800 bed patients	= 20 hrs. $\times$ 2 = 40 hrs.	+ 13 hrs. = 53 hrs. ward trip
100 GM&S patients	= 8 hrs. $\times$ 2 = 16 hrs.	+ 5 hrs. = 21 hrs. GM&S
		49 hrs. patients' library open
		40 hrs. medical library open
		30 hrs. T.A. duties

193 hrs. per week

Staff required: 4½ Professional  
2 Clerical

Tuberculosis hospitals.

1. "Ward trip" indicates hours per week required for ward trips and equals the number of bed patients times three minutes per patient, multiplied by three for three trips per week, plus one hour of preparation for each three hours spent on the ward.

2. "T.A. duties." indicates hours per week required for the technical and administrative duties outlined in the attached explanation.

*Example:* 250-bed tuberculosis hospital

200 bed patients	= 10 hrs. $\times$ 3 = 30 hrs.	+ 10 hrs. = 40 hrs. ward trip
		35 hrs. patients' library open
		30 hrs. medical library open
		20 hrs. T.A. duties

125 hrs. per week

Staff required: 3 Professional\*  
½ Clerical

General medical and surgical hospitals (50 per cent of patients considered bed patients; 50 per cent of patients considered ambulant).

1. "Ward trip" indicates hours per week required for ward trips and equals number of bed patients times five minutes per patient, multiplied by two for two trips per week, plus one hour of preparation for each three hours spent on the ward.

2. "T.A. duties" indicates hours per week required for technical and administrative duties outlined in the attached explanation.

\* Additional part-time professional librarian is suggested.

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3. In hospitals of 2,500 patients and above, one full-time administrator is required and the "administrative duties" are removed from "T.A. duties."

*Examples:* 250-bed general medical and surgical hospital

125 bed patients	= 10½ hrs. × 2 = 21 hrs.	+ 7 hrs. = 28 hrs.	ward trip 28 hrs. patients' library open 20 hrs. medical library open 15 hrs. T.A. duties
—			91 hrs. per week

Staff required: 2 Professional\*  
1 Clerical

1,000-bed general medical and surgical hospital

500 bed patients	= 42 hrs. × 2 = 84 hrs.	+ 28 hrs. = 112 hrs.	ward trip 49 hrs. patients' library open 40 hrs. medical library open 35 hrs. T.A. duties
—			236 hrs. per week

Staff required: 5 Professional\*  
2 Clerical

Although these formulas were most useful in defining staff needs for the three types of hospitals, it was evident from the beginning that the total requirements for librarians under these standards probably would be much larger than the Veterans Administration could support. It was then determined to work out formulas in more detail for specific types of hospitals. The study involved took into consideration certain factors that were not dealt with specifically in the earlier effort. The most important was the physical make-up of the hospital, including the number of buildings, number of wards, and bed capacities.

The following formula, which was developed for the new psychiatric hospitals in the Veterans Administration, is descriptive of the essential elements in the present scheme for Veterans Administration hospitals

\* Additional part-time professional librarian is suggested.

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generally. Under the new building program, although allowances were made for variations in size, a basic plan was used for each of the different kinds of hospitals. For the psychiatric institutions, six separate types of buildings were used in each installation, designed for the treatment of certain classifications of patients. In general, it was determined that patients to be treated in the new psychiatric hospitals would be those suffering from illnesses falling in seven categories. The categories and the buildings to which they would be assigned are as follows:

1. Acute psychiatric disorders with favorable prognoses: Admissions and Treatment Building.
2. Acute general medical and surgical disorders without psychoses: General Medical and Surgical Building.
3. Acute general medical and surgical disorders with psychoses: General Medical and Surgical Building.
4. Chronic psychiatric disorders with guarded prognoses: Continued Treatment Building.
5. Chronic psychiatric disorders associated with disturbed behavior: Disturbed Building.
6. Psychiatric disorders associated with physical infirmities: Infirmary Building.
7. Psychiatric disorders associated with clinical tuberculosis: TB-NP Building.

The capacity of most of these hospitals is about 1,000 beds. Nursing units of standard size are used in all. Shown below is the final development of the staffing pattern for psychiatric hospitals. As indicated, it is determined according to established needs.

**Library staff for standard 1000-bed psychiatric hospital**

**1. General operations**

Duties	Time	Totals
Administration	20 hrs.	
Medical library service	40 hrs.	
Clerical assistance	40 hrs.	
Book cart preparation and transportation	13½ hrs.	
		<hr/> 113½ hrs.

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**2. Specific activities**

a. Service to wards

	<i>Nursing Building</i>	<i>Bed Units</i>	<i>Weekly Capacity</i>	<i>Hrs. Libns. Ward Trips</i>	<i>Time/Week</i>	<i>Totals</i>
Admissions and						
Treatment	7	170		1		5%
General						
Medical and						
Surgical	8	240		2		16
Continued						
Treatment	4	160		1		5%
Infirm	2	100		2		6%
Disturbed	4	120		1		4
TB-NP	4	154		2		5
						—
						42½ hrs.

b. Service to groups of patients within library

	<i>Nursing Building</i>	<i>No. Units</i>	<i>Trips to Lib.</i>	<i>Hrs. Libns. per Group</i>	<i>Time/Week</i>	
Admissions and						
Treatment	7	2	2		4	
General						
Medical and						
Surgical	8	1	1		1	
Continued						
Treatment	4	3	1		3	
Infirm	2	0	0		0	
Disturbed	4	1	1		1	
TB-NP	4	0	0		0	
					—	9
					Total	165½ hrs.

The 165-hour total per week indicates the minimum hours necessary to perform library duties. In order to translate this into requirements in manpower, adjustments must be made for the following factors:

1. Prevalence of 40-hour work week.
2. Government holidays.
3. Annual and sick leave.

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It was determined that the factor of 1.16 when applied to the total 165-hour requirement would indicate the actual man years needed to staff the hospital library. This results in a total of 183 hours. Since a standard government work week is forty hours, the indicated staff size is 4.8 people. The disposition of the library staff and libraries is as follows:

1. Admissions and Treatment Building
  - 1 medical library
  - 1 medical librarian
2. Recreation Building
  - 1 general library
  - 1 chief librarian
  - 1 patients' librarian
  - 1 clerk typist
3. TB-NP Building
  - 1 general library (with separate collection for tubercular patients)
  - 1 librarian

It is evident, of course, that further refinement is needed in staffing patterns of this type. However, the formulas do represent a first effort at workload patterns for hospital libraries. The only prior estimate of workload was that given by Kurd Schulz of Jena, Germany, in 1935, to the effect that one librarian could be expected to circulate about 15,000 books. That, of course, represented an attempt to set up an *a posteriori* standard for determining the need for librarians. Although the Veterans Administration has not reached the levels proposed in all hospitals, the indications are that where they have been achieved a high standard of service has been provided to patients and doctors.

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## Building Design for Library Management

ANGUS SNEAD MACDONALD

THE SUCCESS or failure of a contemplated library building depends largely on thorough study of the project by the library management, both before an architect is appointed and during the development of plans. The term "library management" is intended to include not only the librarian and the principal staff members, but any board or committee sharing responsibility for getting a building that meets its purpose adequately. Obviously it is a prime obligation of such a group to provide wisely for the collecting, preserving, and use of books or other record material, and the design of the building can be a potent factor in promoting or hindering these ends.

Building design involves many factors, such as location, planning of areas, structure, equipment, and aesthetic features. A controlling program should be established by the library management at the outset to serve as a guide for the architect. Failure to have such a program usually results in an unsatisfactory building.

The management necessarily advises and assists the architect in locating the building as well as in the planning of the interior. It should approve the allocation of funds between essentials and luxuries, and between functional and aesthetic features. Artistic aspects should serve library functions but not dominate them. They may promote the use of books greatly, but also they may result in cramping and rendering such use inconvenient. When purely aesthetic features consume an unduly high percentage of building cost, they become the master rather than the servant of the library. The true purpose of the building is then defeated, regardless of how beautiful it may be. No one would argue that to devote 50 per cent of an appropriation for artistic appearances means good design, unless the practical library functions are first provided. While such a proportion is by no means rare, it can be justified only if a munificent donor insists on it and does not at the same time hamper the workability of the library.

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In calculating allocations of funds square-foot costs rather than cubic-foot costs are the better guide, as the management is primarily concerned with floor areas rather than volume of space. Costs per cubic foot are safe criteria only when they apply to a group of buildings of a single type and story height, such as office structures, hotels, or schools. On a cubic-foot basis it might appear that lofty library rooms are economical. On a square-foot basis it is clear that the reverse is true.

The preparation of a building program involves much balancing of relative values and requires judgment based on long experience. This is where a library planning adviser who has thorough familiarity with building construction, library needs, and architectural problems can well earn his salt. The management's program should not only guide the architect but represent a minimum standard of achievement which he can be expected to surpass. With such a governing program the architect will not have to spend an undue proportion of his fees, which are none too large anyway, for one series of sketches after another in endeavoring to put nebulous ideas of the management into concrete form.

At the very beginning of a project the management should acquire knowledge of area costs in other libraries of different types. Otherwise it will work in the dark and not know what total spaces it should expect from the funds in hand or anticipated. Some of the figures available are sure to be for low-cost modular buildings, and for examples of other types that meet library purposes sufficiently and at the same time are aesthetically acceptable. Such costs, after adjustment for location and year of construction, divided into the appropriation available, yield the approximate number of square feet that can be expected.

If an appropriation has not been made and its amount must be determined by analysis, then the management must first decide on the total area that will be required and the kind of building it prefers. Next, a fair cost per square foot for a structure of the preferred type, based on the data collected, should be assumed. The cost then should be multiplied by the total square-foot area needed. The result will be the amount of the necessary appropriation. If funds are tight the building will have to rely for its charm on such inexpensive devices as simplicity, good proportions, natural textures, and attractive colors. Such dependence can yield surprisingly good results, everything considered—better even than might be obtained if large sums were spent for polished marble, gold leaf, elaborate carving, charming patios, and

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murals. Over half a century ago the Boston Public Library was built with full use of such aesthetic resources and with all the skill of the great architect, Charles Follen McKim, of McKim, Mead, and White. Aesthetically this building was an outstanding achievement and became a mecca for tourists, including mostly those not interested in reading. Probably the features that have attracted casual visitors consumed 75 per cent of the building's cost, leaving no more than 25 per cent for those designed primarily to serve readers. As a library the building was unsuccessful.

The above comments are directed toward determining the type and floor area of a proposed building. Now some details can be considered. First, where should the library be located? As use is directly proportional to accessibility, there is a strong trend towards selecting a central location convenient to lines of heaviest traffic, either in a city or on a campus. Provision for future expansion is necessary, and that for car parking highly desirable. The main entrance should be placed so as to invite people into the building and bring them to their destinations with the greatest convenience and with the least disturbance to work in process. An entering flight of steps can be avoided by putting the entrance floor at grade level.

Only in the case of very large libraries should there be more than one entrance-exit in regular use. Where there is no more than one, the distributing of readers and the controlling of departures is simplified. These are important considerations during off-peak hours, when staff numbers must be held down to a minimum. Confining an exit to emergency use may be necessary, but is not easy. To locate the main entrance near the middle of the long side of the building usually is a safe arrangement. Exceptions can be worked out to meet special conditions.

Designing for economy and accessibility directs that there be a first-class story just below the level of the main entrance. The use of modern facilities for damp-proofing, lighting, and ventilation, and the practice of locating mechanical equipment in a roof penthouse, all can serve to abolish the old-fashioned, cluttered, unattractive basement. Its convenient space then can be converted into a "ground" floor that is just as good as any other story, except possibly for lack of windows. Being just a short flight of steps below the main or first floor, this area is too valuable to be demeaned. The ground floor, first or entrance floor, and the second floor usually have enough total space to take care of almost all reader needs. Easy accessibility makes their use independent of elevators. Where a library is set in grounds of

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ample size, a wide and beautifully planted excavation around the ground story, like a dry moat, renders possible good windows and an attractive outlook.

Logical designing usually results in the location of stairs and elevators close to the main entrance and as near the center of a building as possible. This is convenient for readers, promotes easy control of arrivals and departures at the different floor levels, and minimizes the necessity for corridors. Reading areas should not be used as corridors. Toilets can be located most advantageously near the stairs and elevators, and one over another. The stairs and elevators should serve all levels of the library, in both main sections and stacks.

The flow of reader traffic to the different reading areas and the disposition of related sections requires diagramming by management as a preliminary to the starting of plans by the architect. Likewise the relationships of work spaces to each other and to the public must be plotted. The flow of processing operations should be laid out so as to be uninterrupted, and the arrangement should permit members of the staff easily to "pinch-hit" for each other.

The flow of receipts from the delivery entrance through the unpacking room, to the point for checking against orders, to storage before processing, and through cataloguing and preparation for shelving, must be clearly shown for the architect's guidance. Both processors and the public should have easy access to the main card catalog.

At the delivery entrance an unloading platform at truck-bed level, with ramp to floor, is desirable. Unpacking rooms should be thoroughly fire-proofed and insulated against noise. As there usually is a story height between the unpacking room and the processing floor, an elevator is needed. This need not be a special freight elevator, except in large libraries. The public elevator can be used where freight traffic is infrequent.

Since library operations are constantly changing, elasticity for rearrangement is essential. Sections for various purposes should be interchangeable in location as far as possible, and movable equipment should be used to divide areas for different functions. It is preferable to think in terms of areas rather than of rooms, since rooms connote walls and walls mean rigidity. Interior structural walls of solid masonry, or those carrying air ducts and electric conduits, are virtually immovable and therefore inhibit flexibility. These mechanical elements can be taken care of better in outside walls and by enlargements of structural columns or enclosures. In the New York Public Library there

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are about fifty special rooms surrounded by solid, load-bearing, masonry walls. Elasticity is largely absent, and functional parts cannot be reallocated as needs demand. Furthermore, the task of supervision is too onerous to allow all rooms to be kept open during off-peak hours. Determining a policy in respect to ceiling heights is one of the initial problems of design. There are three customary solutions:

1. The building may have 15-foot or 18-foot main-story heights and a multiple-tier stack with 7½-foot or 8-foot tier heights. Main floors then line up with alternate stack floors. This yields large and lofty public rooms, but small rooms and corridors outside the stack either are excessively high or involve the expense and waste of dropped ceilings.
2. With modular construction the stories are 10 feet to 12 feet in span floor to floor, yielding ceilings 8 or 10 feet high. Any public rooms requiring greater loftiness can extend through two stories. With these low ceilings, lighting and ventilation are simplified. Also, stair-climbing and construction costs are minimized. Book storage is somewhat more costly than with multiple-tier stacks.

3. A combination of 1 above with 16-foot stories, and a large general utility or convertible stack area having 8-foot stories and 7½-foot ceiling heights, has many advantages. This utility space should be much larger than required for book storage and book consultation, as it is intended to house all functions that do not require large and lofty rooms. These commonly add up to a surprisingly large proportion of the total area of a building—50 or 60 per cent. The contrast between the high- and the low-ceiling sections is attractive, and the over-all square-foot cost of the building is moderate.

In the case of large libraries, book storage becomes an increasing problem as years go on, and differing provisions based on the varying uses of materials are indicated. For books much in demand the shelving should be openly accessible under the best possible conditions, such as wide aisles, the placing of books neither too close to the floor nor too high to be reached easily, superb lighting, and a policy of keeping shelving constantly cleared of inactive materials and replenished with new ones. A capacity of 100,000 volumes is ample for books in the readily accessible category, even for large libraries.

Rare items and those of high value require better protection than can be accorded on open-access shelves. For current reference books economical stack storage, combined with interrelated reading and

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working facilities, is indicated. Here again the shelves should not be cluttered with obsolete material. Very inactive stock can be kept in super-compact storage, where economy dominates rather than visibility. The facilities for reference resources can be designed to permit conversion into super-compact storage as space fills up.

A question that arises more and more frequently is whether or not to design for air conditioning, that is, ventilation with control of humidity, dust, and temperature in both cold and hot weather. In a small library dependence may be placed entirely on window ventilation, providing the outside exposures to dust, temperature, and noise are not too great. In large libraries mechanical ventilation is advisable, and generally required by law. If cooling and dehumidification are not parts of the ventilating system, generous amounts of air must be forced through it to remove the heat given off by people and lights. This requires large blowers and ducts, whose cost goes a long way toward offsetting the initial and operating costs of cooling and dehumidifying. Artificial cooling permits small blowers and ducts and simplifies planning, as windows and light courts become unnecessary.

There are some finishing touches to a good working library that should not be neglected:

1. Resilient floor tile makes for pleasant and quiet walking. White or light-colored rubber or plastic tile aids in lighting, particularly in stack aisles, where it is otherwise difficult to illuminate the lower rows of books.
2. Sound-absorbent ceilings yield good dividends in quiet, and are worth far more than the cost.
3. There is no factor of design more important than good lighting, and no more difficult problem than that of getting adequate, efficient illumination, free from both direct and reflected glare. Without glare, reading is comfortable under luminaires of relatively low intensity, which keep down the heat and the consumption of current. Artificial lighting can be made more dependable than natural lighting and, everything considered, is less costly. Consequently windows are not necessary except for psychological reasons. Management should see to it that sufficient electric outlets are provided and properly located, both for present and future needs.
4. Ease of maintenance is an important factor in selecting the materials for floors, walls, and ceilings. Saving in first cost often results

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in heavy annual maintenance expense. This is certainly true with painted plaster walls.

5. A collection of books for use in a particular section should be housed in a group of stacks close to the entrance of the section, so that readers can select readily those desired without disturbing other people. Wall-shelving is inconvenient, and expensive in space and capital cost.

The leading factor in getting a good library building is a clear-cut statement, in black and white, of the management's requirements. With such a program the architect can be guided and controlled. Without it he is likely to take the bit in his teeth and produce a monument rather than a library. If that happens the management must bear the principal responsibility, as the architect cannot be expected to meet needs of which he is not clearly informed. Preferably, architect and management will cooperate, each in command of his own field. Sometimes they will lock horns, and compromises will be necessary; but if these are made wisely and after careful consideration, a good, well-balanced building is likely to result.

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## Scientific Management in Cataloging

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SCIENTIFIC MANAGEMENT in cataloging and classification is no more and no less than the application of effective thinking to the solution of the business problems in this part of a library's work. What these problems are depends upon the scope of the activities covered by the phrase "cataloging and classification." To most readers such activities will be synonymous with the work of the catalog departments in the libraries with which they are most familiar. Whether or not the department is part of a larger "technical-processes" organization, whether or not it carries certain responsibilities, such as taking inventory, that in some libraries are assigned to other divisions, the principles of management are equally applicable.

Every department of a library has problems that require continuing study if the institution as a whole is to be operated on a business-like basis; and it is stating the obvious to say that every librarian has a social responsibility for operating his institution in such a way as to derive optimum results from its expenditures. In most research libraries the cost of cataloging and classification amounts to such a large part of the budget that it is of particular significance in a study of scientific management in libraries, and the person charged with direction of the cataloging department has a special obligation to be aware of trends affecting his field.

Cataloging has traditionally and necessarily been attractive to those librarians who are more interested in bibliography and bibliographical problems than in general library administration. The person who can deal with the former is logically held in higher esteem by his colleagues than the one concerned with the latter, and consequently is the more likely to become the head of a cataloging department. The result is a serious shortage of cataloging administrators who, beside possessing the technical competence necessary to hold the respect of the profes-

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sional members of their staff, have developed also the business sense required of the successful executive.

Nevertheless, catalogers probably have been aware of the benefits of scientific management for a longer period and to a greater extent than any other group of librarians; and to many librarians scientific management in the library has been synonymous with scientific management in the cataloging department. One of the earliest contributors to the literature of scientific management in libraries, Willard Austen,<sup>1</sup> wrote that "The work of . . . classifying and cataloging is peculiarly adapted to the application of standardizing and the functional division of labor." He pointed out that "The functional division of labor is peculiarly liable to be ignored in the work of this division, and we not infrequently encounter here a duplication of labor by two or more high-priced officials." C. C. Williamson,<sup>2</sup> in 1919, made a general plea for more attention to efficiency in library management, in which he stated that "Library technique [cataloging, classification, bibliography, etc.] is now relatively efficient." However, his general statement that "Today we may be efficient and tomorrow inefficient, if we do not keep pace with our opportunities" should have prevented the catalogers of 1919 from being self-satisfied.

In 1930 Donald Coney<sup>3</sup> saw the catalog department as the manufacturer of the library's product, through supplying the units of information that make up the catalog, and implied that the same principles of management are applicable here as in business. He pointed out that functionalization, which is one of the principles of scientific management, had been adopted very early in library work because "a group of distinguished and stalwart figures such as Melvil Dewey and C. A. Cutter saw the advantage of standard methods and moved to bring them about. As a result of this early standardization, a trained personnel was necessary to operate the modern library according to the best methods. Once there is a need of a trained personnel, functionalization is inevitable, if for no other reason than as a method of training the personnel."

This standardization of practices, of classification systems, of cataloging rules, and of the structure of catalogs contributed very considerably to defining the duties of that part of the library personnel engaged in cataloging activities, and set off this field for specific analysis from a managerial point of view. At the same time there obviously has been confusion between standardized results of the cataloging effort and uniform methods of getting those results in different libraries.

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The confusion is responsible for many ill-conceived attempts to find the cost of "cataloging," as if cataloging were so standardized that its most minute specifications could be supplied. The same intelligent investigators would not attempt to find the cost of building "a house," on the assumption that this is a standardized commodity, having walls, a roof, doors, windows, and plumbing, but without consideration of its purposes, size, and the workmanship.

Perhaps the reason for Williamson's statement in 1919 that cataloging was relatively efficient was the frequent appearance in the professional journals over a period of almost a half century of reports on the cost of cataloging. These were surveyed by Felix Reichmann in the October 1953 issue of *Library Trends* and will be considered here only to the extent that they contribute to a study of management. Unfortunately their contribution is not very great. Although most examinations of cataloging costs have made catalogers and other librarians "management-conscious," few of them have shed light on the reasons that the expenditures were what they were found to be; few, if any, have resulted in measures that would lead to substantial savings. At least, reports of such results have not been found in the library press.

Many students of this problem have hoped to determine production standards through cost studies, and this indeed would be a contribution to management. Too much faith, however, has been placed in the comparability of statistics and cost figures from one library, whether in terms of money or time, with those of another of the same general type and size, without specific definitions and without consideration of the quality of the product. No study has been found that analyzed adequately the nature of the materials being cataloged, or attempted to evaluate the quality of the work done. Distinctions have been made between fiction and nonfiction, between new titles cataloged and titles recataloged, between monographs and serials, between titles covered by printed cards and those requiring original cataloging, but no piece of research is known that made all these differentiations.

Other important factors affecting costs that have not been given full consideration include the proportion of the titles cataloged representing books in foreign languages; the proportion of early imprints; the average number of subject headings and other secondary entries made; the limitation or lack of limitation placed on the time to be spent on establishing headings; the fullness of cataloging data included on the cards; and the number of titles of special types of material cataloged,

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such as maps, pamphlets and government documents if given special treatment, and children's books. Unless these factors are comparable in the libraries being studied, the statistics and cost figures will not be so, and production standards cannot be determined from them. If they are not comparable for the various catalogers within a given library, individual production or performance based upon production statistics will be unreliable.

This is not to say that cost studies do not supply an important contribution within a given institution, but only to emphasize that they need to be made only after broader aspects of management are considered, and to discourage the misuse of the results of such studies as have been reported. Lest this seem so obvious as not to require statement, one recent example of such misapplication will be cited. In connection with a job analysis and organization survey of a state library,<sup>4</sup> the American Library Association's *Post-War Standards for Public Libraries*<sup>5</sup> was quoted as estimating that forty-five minutes is adequate allowance for cataloging, accessioning, and preparing a new title for the shelves in a library of 300,000 volumes or less. The surveyors of the state library set about determining the workload of its catalogers by adding the total number of titles cataloged and re-cataloged, and then "The unit time factor of 45 minutes was applied to the total of the workloads . . . to obtain the total direct operating time necessary for the cataloging function. An additional allowance of 23 percent of direct operating time was made for leave and rest periods, and the total time required was divided by the scheduled work hours per person during the period to determine the full time personnel equivalent required." The method disregarded the findings that the cataloger spent part of her time in typing cards, in checking the Library of Congress catalog to ascertain whether printed cards were available, and in typing L.C. card orders; that "Working conditions . . . are a serious hindrance to the efficiency of the agency . . ."; and that "some employees performing cataloging and research work are frequently interrupted by library patrons seeking general information about use of the library or assistance in routine reference work." It also ignored the fact that the new job description proposed for the cataloger included the tasks of preparing secondary cards for the catalog, checking the Library of Congress catalog for available cards, and selecting materials for acquisition and exchange.

Perhaps the greatest contribution to the study of management in libraries has been made by catalogers in their many investigations of

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professional and clerical activities. Before the term "job analysis" was a household expression among students of management, the catalogers were analyzing in minute detail the operations being performed by them or under their supervision. Thus they were studying "division of labor," which has been cited by some authorities<sup>6</sup> as the first principle of administration. As early as 1905 W. W. Bishop<sup>7</sup> pointed out that "copyists may be employed at low salaries to reproduce the cataloger's slip. . . . Much more expensive time is consumed when catalogers of experience and training write or print all needed cards, or when cards are written from the marked title pages of the books, as is done in some places." In 1925 the Committee on the Cost of Cataloging of the A.L.A. Catalog Section reported that the so-called "Cataloging Test" of 1913-14 was in part to "study how the work might be arranged so as to be made in some degree less mechanical to those that are capable of more or less independent handling of literary material for the purpose of preparing it for use." This committee also reported that "Today the library must emulate the business organization in employing the cheapest grade of labor where it can be used and using its highest priced labor only for strictly professional work."<sup>8</sup> Laurence J. Kipp and Annie T. Thomas<sup>9</sup> have stated that as early as 1925 typists were being used at Harvard to prepare author cards after the cataloger had indicated the forms of entry to be employed, with certain other details. In the first edition of her *Introduction to Cataloging and the Classification of Books*, Margaret Mann<sup>10</sup> stressed the importance of dividing the operations of the cataloging department between professional and clerical duties in order to relieve the professional cataloger of all unnecessary routines, and in the same year Ruth Wallace<sup>11</sup> pointed out that "Each member of the staff should be doing the most advanced work for which she is equipped" and that "As many typists and pages should be employed as can be provided with work in a given department." Susan G. Akers<sup>12</sup> in 1935 made a detailed study of the activities being performed by professional and clerical workers in the cataloging departments of a group of typical libraries, and of the way a group of representative catalogers thought they should be divided between professional and clerical workers.

Donald Coney, H. H. Henkle, and G. F. Purdy suggest that management could be improved by assigning certain duties in the cataloging process to a third category of workers. They state that "Searching for authorities by which to establish the proper form of the author's name under which the item is to be entered . . . can be performed by

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sub-professional workers of intelligence and experience."<sup>13</sup> The survey of personnel in catalog departments in public libraries<sup>14</sup> that was undertaken in 1949 by a Special Committee on Personnel of the A.L.A. Division of Cataloging and Classification took account of this third group of workers in its examination of professional and nonprofessional duties in catalog departments in public libraries having 100,000 or more volumes. It treated nonprofessional duties as those performed by subprofessional and clerical workers.

The study in question was based upon the cataloging and classification section of the "Descriptive List of Professional and Nonprofessional Duties in Libraries," prepared in a preliminary draft in 1948 by a special subcommittee of the A.L.A. Board on Personnel Administration. The duties listed are fewer and hence less specific than those compiled by Miss Akers, but indicate well enough the present state of affairs in their area of the division of labor. In the list of professional activities there are only two, i.e., "establishing cataloging and classification policies" and "participating in cooperative cataloging," that are performed exclusively by professional catalogers. Among the nonprofessional duties there are none that are not actually being discharged by professional catalogers. Whereas 95 per cent of the professional duties are carried out by professional assistants, it is found that when duplication of classes performing the duties is considered, only 89 per cent of the total checks represent performance by professional people, 8 per cent represent performance by subprofessional, and 3 per cent by clerical workers. Similar figures for the nonprofessional duties indicate that only 64 per cent are carried by nonprofessional assistants; and when duplication of classes performing the operations is considered, "the percentage of duties performed by nonprofessionals is only 55 per cent, of which 20 per cent are subprofessional and 35 per cent clerical, with the professionals performing 45 per cent."<sup>15</sup>

Thus despite the fact that many studies have been made on the division of labor between professional and nonprofessional duties in cataloging departments, full advantage has not yet been taken of the results. Jerrold Orne reported that cataloging costs were cut in one library, with increased salaries being paid to all personnel, simply by making better use of clerical help and accepting uncritically the information on Library of Congress cards. "Most catalogers," he says, "are intrigued by proposals to limit them to purely professional tasks, and they welcome the help of subprofessional and clerical workers who can do many of the operations performed by professionals in smaller

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units." <sup>16</sup> This substantiates the earlier statement of the head cataloger of a university library who said in 1941 that "It is usually an economy to turn over checking of L.C. cards to a clerical or junior cataloger and allow them to pass through unchallenged." <sup>17</sup> The same idea is reported by Watson O'D. Pierce, who received the following comment from one member of a catalog department staff while he was studying work measurement as a part of the Public Library Inquiry:

How much so-called subject cataloging and classification nowadays is actually subject cataloging and classification. It is true Dewey numbers have to be modified and subject headings adjusted to fit local needs. Still there is much copying. With the L.C. Catalog and the L.C. and Wilson cards on hand the original brain work has been done. . . . To acknowledge these facts might be disconcerting—but from a professional point of view much may be gained by calling a spade a spade in greater streamlining and in release of professional ability for other work. It might in fact save the library (and tax-payer) money and would be more inspiring to the professional worker to change its variations to conform to L.C. or accepted practice rather than to maintain a professional staff performing copy work half the time.<sup>18</sup>

Patently, good management requires that the best use be made of each person's ability. In the catalog department this means not only that professional assistants should not be permitted to do tasks of which subprofessional or clerical workers are capable, but also that the organization of the professional work should be based upon the ability or potential ability of the personnel. L. R. Wilson and Maurice Tauber <sup>19</sup> list four methods of organization: (1) by process, i.e., accessioning, author cataloging, subject cataloging, classifying; (2) by subject or subject division; (3) by language; (4) by form or type of material, such as serials, documents, pamphlets, and theses. According to these authors "division by process makes for economy; by subject, for 'scholarly' classification and subject-cataloging." On the other hand, surveyors of the Indiana University Library in 1940 sent questionnaires to all university libraries using the Library of Congress Classification, and on the basis of fifty-three replies concluded that "it is apparent that for speed and low cost, a combination of classifying with cataloging is regarded as an appropriate type of organization. Another value in this organization lies in the familiarity of many catalogers with the use of the classification schedule. As a result, a library is less likely to be in the awkward position of not being able to maintain a flow of classifying work. . . ." <sup>20</sup>

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Similar differences of opinion are reflected in a "Symposium on the Division of Professional Activities in the Catalog Department."<sup>21</sup> True efficiency requires that all of the factors affecting both quantity and quality of the work be taken into consideration. In this case these factors include linguistic and subject knowledge on the part of the personnel, the need for such knowledge in the cataloging of a given library, the disadvantage of unnecessary handling of a given volume in the cataloging process (which may be related to the physical layout of the working quarters), the merit of specialization on the part of the individual worker, the advantage of having the most flexible staff, and—by no means the least important—the interest of the staff.

In evaluating the "Cataloging Test" of 1913-14, A. G. S. Josephson<sup>22</sup> found that "the possibility of organizing the work in the individual library so as to utilize to a larger extent than is now the case the special interests and the special knowledge of the individual" stood out as one of the most important ideas resulting from the test. Referring to this situation, Anna M. Monrad wrote: "The discovery or development of unusual ability in special fields of knowledge or in technical ability of individual members of the staff can easily make an existent organization stupid and wasteful."<sup>21</sup> And Paul Howard's conclusion for library organization in general is applicable: "Often it becomes advisable to fit the organization to the personnel rather than the personnel to the organization."<sup>6</sup>

From the foregoing it can be concluded that scientific management in cataloging and classification must be studied in relation to a given situation. The administrator cannot do better than apply the elementary advice of the Job Methods Training Program which was publicized by the government's War Manpower Commission.<sup>23</sup> This the Commission called "a practical plan to help you produce greater quantities of quality products in less time, by making the best use of the manpower, machines and materials . . . available." Step I reads, "Break down the job." In the catalog department this would involve the preparation of a very detailed manual of procedure, an organization chart, and a flow chart.

Step II reads, "Question every detail" and advises the use of the ensuing types of questions: "Why is it necessary? What is its purpose? Where should it be done? When should it be done? Who is best qualified to do it? How is the 'best way' to do it?" Applied to cataloging and classification, this would lead to the formulation of objectives in

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regard to the catalog and the classification. Questions of who uses the catalog and for what purposes and of potential use would be considered. The necessity for local adaptations and the maintenance of special files and catalogs would be re-evaluated. The over-all organization lines of authority and responsibility, amount and kind of revision, kinds of statistics, layout of the department, equipment, and details of housekeeping would be questioned. "Who is best qualified to do it?" should be reworded to "Can anyone less qualified do it?"

Ralph R. Shaw<sup>24</sup> makes a thought-provoking suggestion to be borne in mind when considering the amount and kind of revision that is necessary for a given operation. He proposes the establishment of qualiquants—qualitative quantitative standards—which result in setting an objective level of quality for a cataloging reviser's work. If a cataloger meets that level of quality he should be paid the same rate as the reviser and the latter should be eliminated.

Step III, "Develop the new method," will result in rewriting the manual of procedure because there always will be some details that can be eliminated or combined or simplified, or some operations that can be rearranged in better sequence. Step IV, "Apply the new method," hardly needs mentioning.

Many cataloging departments already have detailed manuals of procedure—in this they have been ahead of their colleagues in other departments—and are aware of the benefits that develop from the mere writing down of what is to be done, by whom, and how. It is not an exaggeration to say that it is administratively irresponsible not to have such a handbook, regardless of the size of the department. Successors as well as co-workers need to have the policies and practices in writing. But to be useful, manuals must be subject to continuous revision. J. A. Humphry<sup>25</sup> has reported that "No established manual of practice should be considered applicable for all time; the search for simplification and elimination of unnecessary operations is a never ending process."

Library literature has included more reports regarding the search for simplification and elimination of unnecessary operations than can be summarized or even mentioned here, but a few of the more significant ones are listed at the end of this paper. Each study explains a procedure or specific method in use that should be equally successful in some other library, if not in all libraries. Arnold H. Trotier<sup>26</sup> has said, ". . . neither the cataloger nor the administrator is so much concerned about theoretical economies as about those economies which

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have proved effective in the course of actual library practice." Application of the appropriate devices, whether they refer to over-all organization, flow of work, simplification of the cataloging or classification themselves, the duplication of catalog cards, or some detailed operation in the physical processing of materials for the library's collections, such as the use of an electrical gluing machine, will go far in improving management and will suggest other improvements. The following word of caution is in order for the zealous cataloging administrator, however: "*Economy* in cataloging is economy that actually saves expense in money or time on the library budget as a whole, and does not merely save this expense in the catalog department to transfer it to another department or to some future time."<sup>27</sup>

The most extensive management study of an individual cataloging establishment found is the recent survey made at the New York Public Library by Cresap, McCormick, and Paget, a firm of management engineers. R. E. Kingery<sup>28</sup> has described the scope and objectives of the survey and discussed some of its findings. The specific methods followed demonstrate many of the arguments advanced above. The study was based upon personal conferences with the staff, job analyses, charts, manuals, and reports previously made, visits to other libraries, and review of library surveys. Each step in the procedures examined was considered to see whether it was necessary at all, and whether it was being performed by the right person and at the right time in the process. Time tests were run on a selective basis. Investigations were made of the cost of printing catalog cards, of reproducing them by offset, and of purchasing Library of Congress cards and preparing them for the N.Y.P.L. catalogs. There also was a detailed study of the physical aspects of the Preparation Division to determine

The division layout and its effects on administration.

The flow space allotted each section and its adequacy for the type of work performed and the number of people involved.

The arrangement of furniture and equipment within each area of the division.

The condition, use, and adequacy of each piece of furniture and equipment.<sup>29</sup>

The number, size, and location of all of the catalogs that were being maintained were examined, and an analysis was made of the cataloging done over twelve months, including new, "adds," and recataloged titles, and books, documents, films, serials, and maps.

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The surveyors observed that "The concept of repetitive operation which is the keynote of economical mass production in business is strikingly absent in the Library because each new piece prepared may present new or unusual problems to the searcher, the cataloger, the filer and other assistants."<sup>20</sup> Nevertheless, they isolated three principal problems:

First—is new work handled in a timely manner so that materials are made accessible within a minimum of elapsed time after receipt?

Second—are cataloging decisions sufficient to clearly identify reference holdings for all classes of readers?

Third—is the cost per unit processed reasonable?<sup>21</sup>

Within this framework the surveyors made their detailed study, which resulted in seventy-five specific recommendations that were developed jointly with the management of the Preparation Division. These were designed to meet four objectives: (1) to simplify and clarify the organization structure, (2) to provide stronger supervision and control, (3) to provide greater flexibility and assure better utilization of each member's highest skills, and (4) to improve office location, layout, and furnishings in order to facilitate supervision and provide a more comfortable working environment. One outstanding feature of this survey was the emphasis placed on staff participation in the consideration of the report and in the acceptance and installation of most of the recommendations.<sup>22</sup>

Every student of scientific management would agree with Shaw<sup>23</sup> that "people are at least as important as systems" and recognize that the best schemes of operation require working conditions enabling a staff to enjoy its tasks and take pride in them. The conditions in question concern pay, hours, vacations, privileges, and the like, which are of the same interest to catalogers as to the rest of a library staff, but they also include such essentials as adequate lighting; light-weight book trucks, in sufficient numbers to reduce physical exertion to a minimum; adequate working space; typewriters in good repair, kept so by experts rather than by catalogers; comfortable chairs and other furnishings and supplies designed for the uses to be made of them.

People need more than the materialistic things mentioned above. They need incentives, credit when credit is due, and an opportunity to participate in the decisions that affect them. A basic incentive for a young cataloger is to be aware of the fact that he will be able to work independently, without revision, when his work approaches

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a certain degree of maturity and accuracy. Catalogers seldom benefit from incentives that are derived from personal contact with satisfied users of the catalog, and efforts must be made to compensate for this. However, the fact that catalogers and classifiers are professional workers, generally with more to offer than their specific assignments require, makes it relatively easy for an administrator to let them participate in decisions, whether touching their own situations or the institution's service. An entire article could be written on the personal element in scientific management in cataloging and classification. Suffice it to say here that that element is probably the most important one of all.

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*By Harold K. Guinzburg, Robert Frase, and Theodore Waller*

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